

January/February 1995

US NAVY

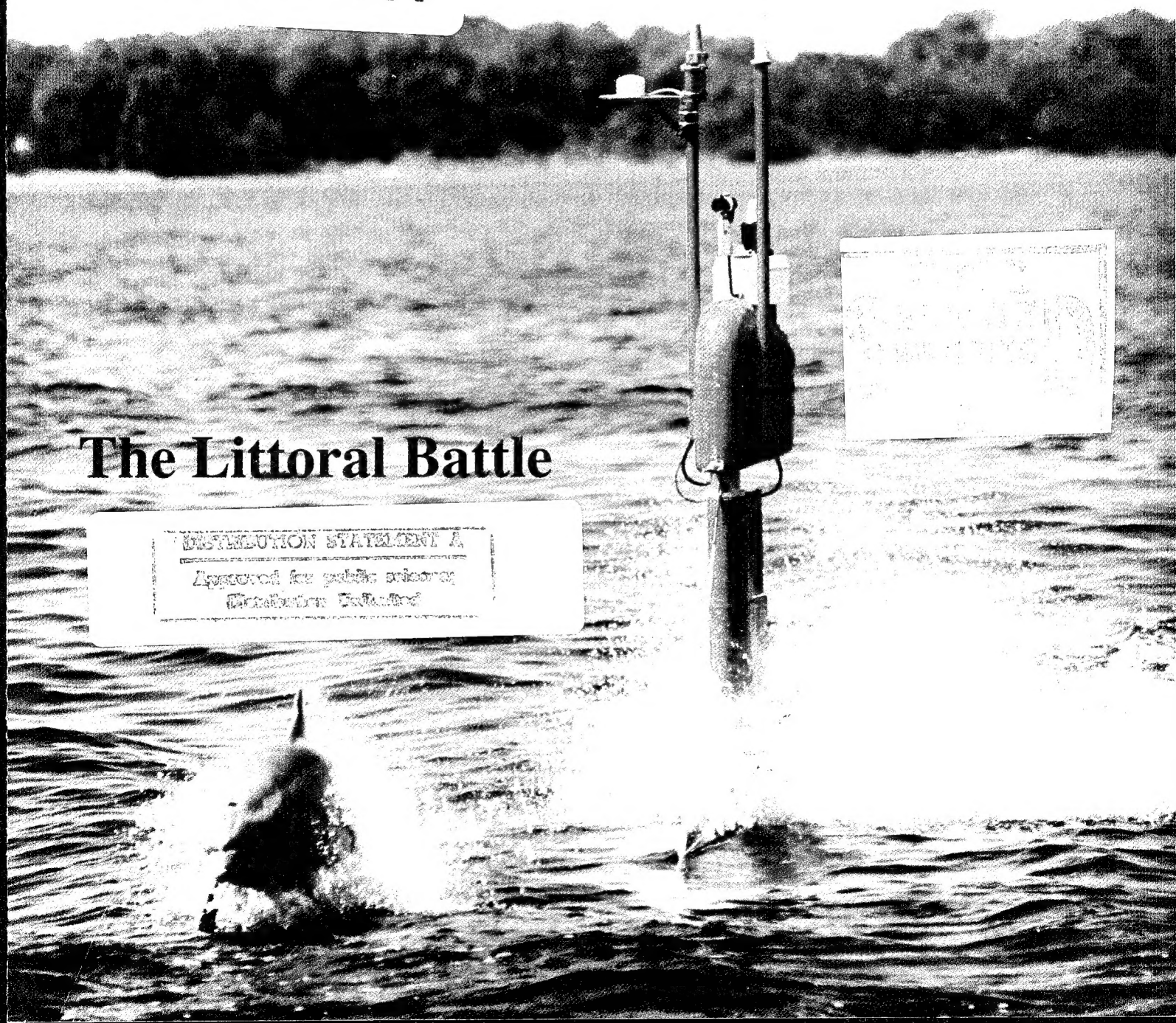
Surface Warfare

19950316 086

The Littoral Battle

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited



The Littoral Battle

In this issue of *Surface Warfare Magazine*, we turn our focus toward fighting in the littorals. The post-Cold War era has demanded that we adapt our strategies, tactics and technologies to conform to this much more active and dangerous area of operations. Unlike open-ocean warfare in which we could focus all our attention on the Soviet threat, we now must be able to operate in the littorals where there is a wider variety of threats, a greater degree of uncertainty and a higher number of adverse environmental conditions.



The four *fundamental* threats we face in the littorals are mines, diesel submarines, sea-skimming cruise missiles and tactical ballistic missiles. To take full advantage of our capabilities — to control the battlespace, to act as the “enabling” and “sustaining” force for our sister services and to provide power projection in support of the land battle — we must *first* preserve the force by effectively neutralizing these fundamental threats. In other words, we must win the littoral battle *before* ground forces can win.

Surface Navy officials in Washington are working together with leaders in the fleet to develop new weapons systems and high-tech improvements to existing systems that will aid in littoral warfighting. Many of these innovative systems are detailed in this issue of *Surface Warfare Magazine*.

I also bring to your attention the synopsis of the 1993-94 Surface Combatant Force Level Study on page 2. Based on a dual-MRC scenario, the study calls for a minimum requirement of between 135-145 U.S. Navy surface combatants. This important study has laid the groundwork in shaping our fleet for the 21st century.

More importantly, as force-structure downsizing begins to stabilize, Navy leadership is making a concerted effort to show you — our Fleet Sailors — that we sincerely care about you, your family and your future. In this issue, we provide a series of articles which provide meaningful insight on career issues concerning both senior and junior officers as well as enlisted personnel.

Finally, as I look back on where we’ve been and all we’ve done over the past year — Rwanda, Haiti, Iraq, Bosnia, etc. — I want to commend each of you on a job well done. As always, you have performed your duties with the utmost pride and professionalism. You have done your nation proud!

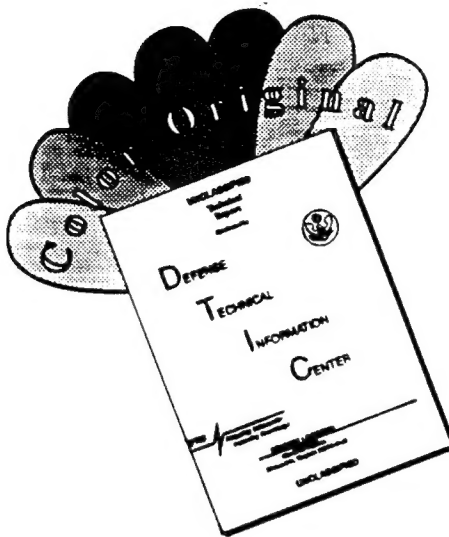
Keep up the good work.

A large, stylized handwritten signature in black ink, reading "P. J. Coady".

Philip J. Coady
Rear Admiral, U.S. Navy

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution	
Availability Codes	
Avail and/or	Special
A-1	

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF COLOR PAGES WHICH DO NOT REPRODUCE LEGIBLY ON BLACK AND WHITE MICROFICHE.

Surface Warfare

Magazine

Rear Admiral Philip J. Coady, USN
Director, Surface Warfare Division

Surface Warfare is the professional magazine of the surface warfare community. Its mission is to further the objectives of the Chief of Naval Operations by disseminating information to the surface warfare community which will increase professionalism, improve readiness and sustainability, augment retention and enhance a sense of common identity and esprit. The opinions and assertions herein are the personal ones of the authors and do not necessarily reflect the official views of the U.S. government, the Department of Defense or the Department of the Navy.

Editor-in-Chief
Nicholas Sabalos Jr.
CDR, 1115, USNR

Editor
LT Jon P. Walman, USN

Managing Editor
JOC(AW) Gloria L. Montgomery, USN

Staff Journalists
JO2(AW) Robert F. James, USN
JO2 Candice N. Lee, USN

Surface Warfare (USPS 104-170) (ISSN 0145-1073) is published bimonthly from appropriated funds by authority of the Chief of Naval Operations in accordance with NPPRP-35. The Secretary of the Navy has determined that this publication is necessary in the transaction of business required by law of the Department of the Navy. Use of funds for printing this publication has been approved by the Navy Publications and Printing Policy Committee. Reproduction is encouraged. Controlled circulation. Second class postage paid at Alexandria, VA and additional mailing offices.

Editorial: Phone queries are encouraged prior to article submission. Send articles and letters to:

Managing Editor, *Surface Warfare* Magazine, N86X
601 N. Fairfax St., Room 270, Alexandria, VA 22314-2007

Commercial: (703) 274-4535

Autovon: 284-4335

FAX: (703) 274-0743

Postmasters send address changes to the above address.

Subscriptions: For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

January/February 1995
Vol. 20, No. 1

In this issue:

On the cover The Littoral Battle

- 12 Mine warriors exploit unfamiliar domain:
New technologies focus on organic capabilities
- 16 Dolphin warriors:
Contrasting MCM systems show promise
- 18 Seeing through clutter: CANDO performs flawlessly
- 20 Seahawks fight fire with fire: Hellfire/FLIR key to littoral warfare success
- 24 Lightweight Hybrid Torpedo: Affordability through commonality
- 26 Speeding up ASW: Innovative management system to replace **Spruances'** manual DRT operations
- 34 Surface Forum: Guard our Gators!
Frigates needed to protect Amphibious Ready Groups
- 28 Naval Surface Fire Support: "Call for fire"
- 31 Expeditionary Warfare: Conference explores future direction

Also in this issue

- 7 Commander Command: Navigating the Selection Board successfully
- 8 1993 Equal Opportunity/Sexual Harassment Study:
Survey shows positive perception of Navy policy
- 9 MCPON's advancement tips
- 10 Surface Warfare Officers: Taking care of our own
- 32 Wanted: Skippers
Small boats offer unique opportunities for Surface Warriors
- 36 SITREP

Cover: Mine countermeasure initiatives unite man's technological wonder with one of nature's most intelligent creatures. (See page 16)

Centerfold: Artist's concept of SH-60B helicopter launching a Hellfire missile. (Provided by Sikorski Aircraft)

Back cover: A Standard missile is fired from USS *Mitscher* (DDG 57), commissioned in December.

1993-94 Surface Combatant Force Level Study Overview

Editor's note: This is a preliminary draft of the 1993-94 Surface Combatant Force Levels Study (SCFLS). It is presented here to inform the surface warfare community of the factors used in determining the future composition of the surface fleet. It is not the final word on the study, its recommendations or the composition of our future fleet.

As we enter the last years of this century, the nation faces critical decisions regarding tomorrow's fleet. The Department of Defense and Navy leadership will need the best, most complete and accurate information possible to make the right choices for the future. Since the mid-1980s, fiscal constraints have resulted in a dramatic downsizing of all elements of the U.S. Armed Forces, with the Navy projected to decline well below a high of 561 ships in 1988. If the assumptions and conclusions of the 1993 *Bottom-Up Review* remain valid, by 1995 the Navy will reduce its carrier fleet by 15 percent since 1985, the number of nuclear attack submarines by 17 percent, amphibious warfare ships by 34 percent, and surface combatants – cruisers, destroyers, and frigates – by 42 percent, as shown in **Figure ES-1**.

However, the post-Cold War international environment, the President's 1994 *National Security Strategy of the United States*, and the new *Forward...From the Sea* strategic concept for the Navy and Marine Corps envision a greater, not lesser, role for and commitment of naval forces to safeguard important U.S. interests, our citizens, their property, and friends and allies wherever they

may be at risk. Indeed, in the post-Cold War era, Navy and Marine Corps' crisis response duties have remained at or above the level of the Cold War. Including the most recent support to Haitian and Cuban operations, U.S. naval forces have responded to more than 60 crises worldwide since 1980. These commitments

have been in excess of the fleet's routine forward-deployed presence operations, but would not have been possible had those forces not already been operating in forward areas. Surface combatants, alone or in concert with other naval forces, participated in 92 percent of these crisis-response missions. What is more telling is the fact that the theater Commanders in Chief (CinCs) have usually demanded the commitment of more capable multimission warships such as the *Ticonderoga* (CG 47) class Aegis cruisers and TOMAHAWK-equipped vertical launch ships to meet their real-world needs, especially in the gray area between peace and crisis.

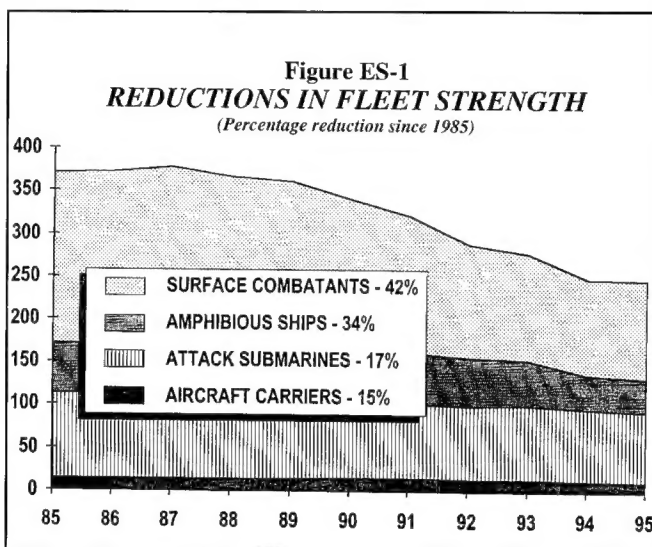
Although some important decisions affecting surface combatant

force levels have already been taken, there has been no recent comprehensive, objective, and empirical analysis of current and projected future surface combatant forces needed to carry out the full spectrum of operations envisioned under the new strategy. The previous force-level study – the Surface Combatant Force Re-

quirements Study (SCFRS) – was conducted in the mid-1980s and addressed war-fighting needs within the context of the Cold War-era Maritime Strategy. SCFRS concluded that a "minimum essential" force of 224 surface combatants – comprising the four *Iowa* (BB-61) class battleships, 120 "battle force-capable" Aegis-type multi-mission warships, and 100 less-capable "protection of shipping" surface

combatants – was required to carry out the operational plans of the period at an acceptable level of risk. If only the less capable, mission-constrained ships were available, a much larger force of approximately 416 surface combatants would have been needed.

Given the context of joint warfare called for by the Goldwater-Nichols Department of Defense Reorganization Act of 1986, some may conclude that the 116 surface combatants that emerged from the *Bottom-Up Review* process are sufficient to meet regional peacetime and crisis response requirements. These 116 ships would also be required to satisfy wartime needs as outlined by the Defense Planning Guidance (DPG), including the capability to win two "nearly si-



multaneous" major regional conflicts (MRCs). Absent an analytical assessment that would validate the numbers and types of surface combatants needed to respond to the challenges of the new international conflict environment, however, such conclusions could be no more than educated guesses.

Surface Combatant Force Level Study

Overview

Accordingly, in the fall of 1993 the Director, Surface Warfare (N86), convened the Surface Combatant Force Level Study to analytically determine the numbers and mix of cruisers, destroyers and frigates required to meet forward-presence, crisis-response and warfighting demands out to the year 2010. Although 1993 and 1994 peacetime and crisis-response operations had already increased fleet operational tempo beyond what a 116-warship force objective could sustain, the focus of the study was on the overall *warfighting* capability of the force, addressing the threat of proliferating technologies, warfighting risk, and survivability in close-in, littoral operations.

Adapting a variety of analytical tools to such a complex task, the study used a multidisciplinary methodology combining force-on-force wargaming, dynamic modeling and technical analysis, balanced with operational qualitative judgment. The illustrative scenario entailed two near-simultaneous MRCs, with MRC-West (Korea) being the first conflict, followed by the MRC-East

Figure ES-2
ANALYSIS ROADMAP

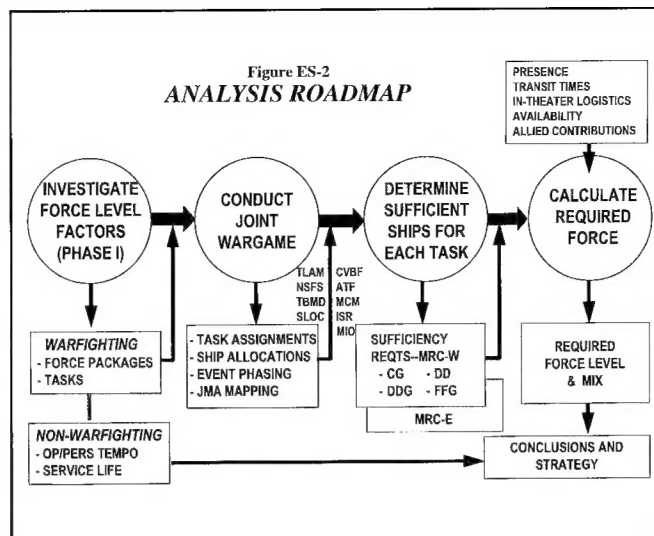
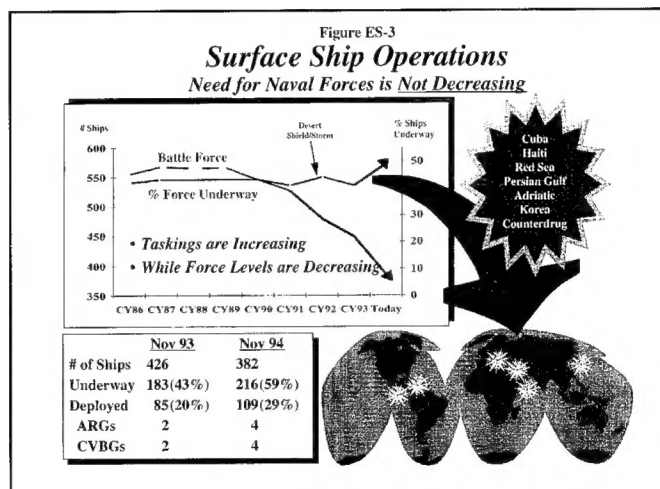


Figure ES-3
Surface Ship Operations
Need for Naval Forces is Not Decreasing



(Persian Gulf). In light of the mid-1994 crisis regarding suspected North Korean nuclear weapons programs and our experiences during the 1990-1991 Persian Gulf War, this scenario provided a realistic case by which to examine surface combatant employment and to derive requirements. The overall study approach and phases are shown in **Figure ES-2**.

Non-Warfighting Requirements

The study effort began with a thorough review of key non-warfighting requirements, including current Operational Tempo (OPTEMPO) and Personnel Tempo (PERSTEMPO) requirements, routine peacetime force operating profiles, employment

trends and force compositions. Historical operating data indicate that, in consonance with the overall return of U.S. forces to the continental United States (CONUS) and the reduced naval force structure, there has been a greater reliance on surface combatants – especially fully capable, multi-mission surface warships – to fulfill normal peacetime commitments and crisis deployments. Service-life factors were also addressed, concluding that current service-life expectations are overly optimistic unless cruisers and destroyers are modernized.

It was clearly evident from this phase of the study that it has become increasingly difficult for fleet commanders to meet both routine and crisis response commitments while staying within the operating guidelines for people and ships. (**Figure ES-3** shows recent OPTEMPO and PERSTEMPO experience.) This has sobering implications for our ability to carry out wartime timelines as well as to satisfy routine peacetime demands that call for combat-credible forces to execute our national strategy.

Joint Wargame

The Joint Multi-Warfare Analytical Game (JMAG) 1-94 was a detailed, rigorous and comprehensive operational-level campaign that took into account both U.S. and allied forces. The free-play force-on-force wargame addressed the warfighting tasks assigned to surface combatants by joint theater commanders within the context of the two-MRC sce-

nario. Recently retired flag and general officers from the Navy, Marine Corps, Army and Air Force played theater warfighting commanders roles, with currently programmed forces. Each campaign was played on a weekly basis during a period of several months, with gameplay routinely subjected to a detailed "scrub" by a senior joint review board comprising retired three- and four-star officers from all services.

In addition to providing the operational context for assessing surface combatant allocation tasks within the joint theater, the wargame provided a detailed time-phased list of important littoral warfare tasks – supporting the Joint Mission Areas – sequentially assigned to specific surface warships. The specific tasks included theater ballistic missile defense (TBMD); cruise missile strike; protection of the sea lines of communication (SLOCs); naval surface fire support (NSFS); protection for aircraft carrier battle groups (CVBGs), amphibious ready groups and task forces (ARGs/ATFs) and mine counter-measures (MCM) groups; intelligence collection, surveillance and reconnaissance (ISR); and maritime interdiction operations (MIO).

In addition to the primary tasks assigned to specific surface warships, which determined their geographic stationing in theater, each ship carried out several additional tasks simultaneously. The JMAG permitted an analysis of the number and type of tasks to be accomplished by surface combatants during each phase of the campaign. Finally, in addition to force structure and mix, time-phasing of tasks and ships yielded key insights suggesting broad implications for current and future naval strategy, doctrine, training and specific required capabilities, as shown in **Table ES-1**.

Issues

The game highlighted several important issues. *First*, littoral warfare will be a "come-as-you-are" scenario – we will have to fight with what is immediately available and with whatever ships can quickly be massed in the theater. Combat-capable, multi-

Table ES-1
Study Campaign Analysis: Key Surface Combatant Tasks
• Protection of theater lines of strategic approach, ports of debarkation and coastal airfields
• Ballistic and cruise missile defense
• Battlespace dominance
• Continuous protection of critical assets afloat and ashore
• Strategic mobility forces
• Theater logistics forces
• Ports, airfields, staging areas
• Strike forces
• Mine countermeasures forces
• Amphibious forces
• Support of amphibious operations
• Theater response to ground force calls for fire
• Strategic strike

mission warships forward deployed to critical world regions are vitally important to contain crises or to carry out sustained combat operations in the event of an emergency or conflict. Tailoring of individual ship's weapons loadouts for specific missions is not always timely or practical in the early phases of the campaign. Increased ship construction or even accelerated completion of ships undergoing shipyard availabilities cannot compensate for inadequate force levels before the fighting begins.

Second, the presence of multi-mission surface combatants early in the

campaign proved to be critical for successfully supporting the initial ground operations and for enabling the entry of follow-on forces and reinforcements. In addition to their specific warfighting strengths, such as strike, and theater air defense, naval forces bring robust command, control and communications capabilities to the theater that *immediately* serve the joint commander across the entire spectrum of warfighting. This is particularly important while land-based systems are being air- or sea-lifted into the theater, assembled ashore and made operational.

Third, the wargame underscored the complexity of littoral warfare. The littoral conflict environment is much more demanding than open-ocean warfare. A multi-faceted (air, surface and sub-surface), 360-degree, 24-hour per day threat; significantly reduced response time; poor sensor conditions; and the prevalence, especially in the initial stages of the campaign, of neutral shipping and aircraft make it a difficult area in which to fight.

Fourth, if an adversary possesses ballistic missiles, cruise missiles and submarines, we should expect that these threats will persist throughout the duration of the campaign. Perfect intelligence is an abstract concept as we can never have full accountability for all of the weapons in an enemy's inventory, prior to or at the outset of the conflict.

Finally, surface combatants were used by the ground commander as maneuver elements in direct support of the ground campaign. This utility of surface combatants highlights the *fundamental* difference of littoral warfare: direct access to the battlefield by seapower. Inasmuch as the United States enjoys a considerable advantage at sea, the littoral campaign offers the opportunity for using maneuver by sea as a force multiplier. Moreover, the littoral offers an environment in which American forces can exploit this comparative advantage in technology and

mobility to win quickly and decisively, even when outnumbered.

The campaign analysis identified the critical roles and tasks listed in **Table ES-1** that may be assigned to surface combatants in future littoral conflicts. This, in turn, permitted the study to examine comprehensively the specific mission contributions of surface naval forces on the littoral campaign. Chief among these were capabilities that *enable* the maneuver – from sea to shore, on land, and from shore to sea for rapid redeployment – of ground forces (both Marines and Army), the continuous protection of critical sea- and land-based assets (including coastal airfields and ports) and the early delivery of cruise missile strikes.

These tasks and missions were then analyzed against a highly detailed and validated threat to determine overall force sufficiency.

Sufficiency Assessment

The Johns Hopkins University Applied Physics Laboratory (JHU/APL) conducted a technical sufficiency analysis of the specific surface combatant roles and tasks, involving the determination of the *mission sufficiency* of individual ships or groups of ships to accomplish the mission at hand – i.e. the number of ships and weapons to conduct successful TBMD of a given area – and *tactical sufficiency* of individual ships or groups of ships to defend themselves – i.e. to provide air, surface and subsurface battlespace

dominance.

The Office of Naval Intelligence (ONI) provided the validated threat; subsequent JHU/APL analysis determined the minimum required number and mix of surface warships for each task expected during the initial MRC campaign. The study then used these requirements, together with the wargame play of the second MRC (Southwest Asia/Persian Gulf), to produce a time-phased deployment plan to meet the DPG's near-simultaneous dual-MRC requirement.

Force Calculus

The study used the sufficiency analysis as an input to a force requirement calculus that included global presence requirements, transit times to and between theaters,

in-theater logistics and maintenance, availability of specific ship types and support from allies. This was done for both MRCs, in accordance with DPG criteria.

Figure ES-4 shows the results of factoring the requirements for both MRCs, forward-presence forces, in-theater logistics, U.S. warship availability and an assumption of the availability of allied surface combatants to round out overall requirements.

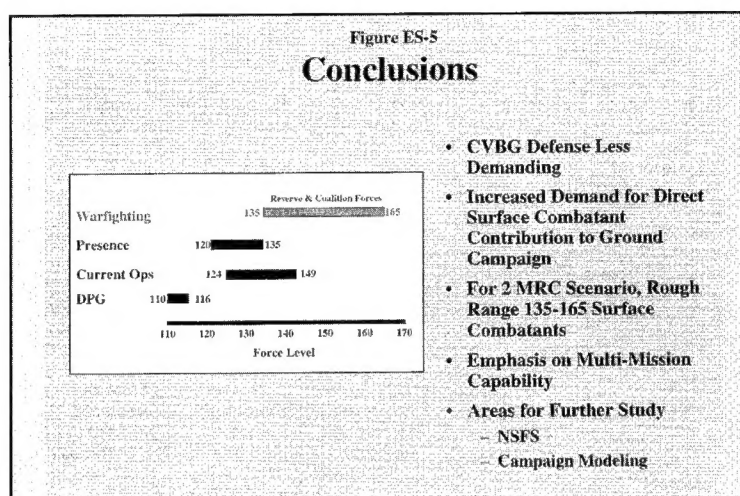
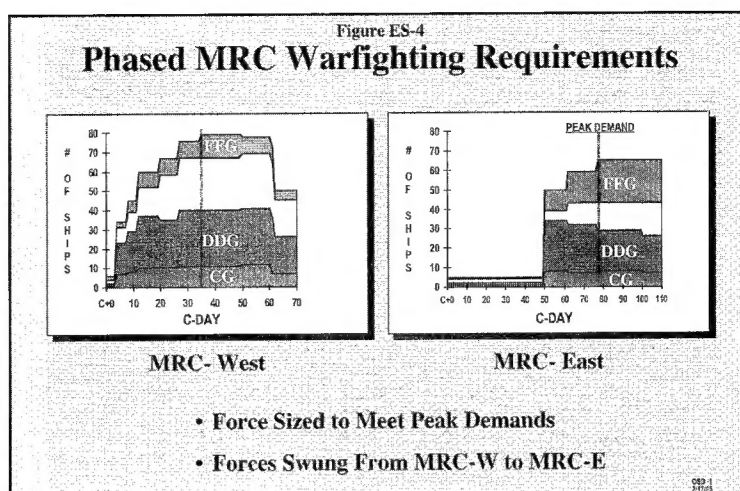
Conclusions and Recommendations

Based on a highly credible and empirical analysis, the study determined the required U.S. surface combatant force level objective to be 165 warships, most of which

must be multi-mission Aegis cruisers and destroyers.

As depicted in **Figure ES-5**, the study also concluded the 165 surface combatants requirement can be mitigated to 135 when taking into account the potential for allied support. However, allied ship contribution is uncertain in terms of timeliness, quantity and quality. Therefore, to hedge against the uncertainty of allied support, the study further recommended that 10-11 U.S. Naval Reserve frigates be retained. Thus, the overall U.S. surface combatant force level required to realistically support the dual-MRC scenario is 145.

Beyond building up to a minimum force level of 145 surface combatants, the Navy must also continue its programs to develop and deliver



to the fleet systems and weapons needed for joint warfighting in the littoral environment. It must also develop innovative ways to increase the availability of forward-presence forces to respond immediately to unanticipated crises and to be ready for war, should war come. Such a posture will assure conventional deterrence in regions of critical importance to the United States and endure as a cornerstone of the national security strategy.

In addition to determining a force-level requirement of 165 surface combatants, the Surface Combatant Force Level Study broke new ground by developing a credible, rigorous and analytically sound methodology. Additional research and analysis will be needed to address the implications of the preliminary results and insight for naval strategy and doctrine, logistics and support capabilities and the U.S. defense industrial base.

In regional, joint campaigns, the Navy's contribution to mission and campaign success is predominant during the early stages of the conflict. The forward-deployed presence of highly capable, multi-mission surface warships is the *sine qua non* to blunt and then turn a future adversary's aggression. In as much as the threat has not and will not remain static, so too must the capabilities of America's surface force continue to evolve, especially in response to the special challenge of joint littoral warfare.

As a bottom line, the Navy's surface forces must provide our nation's leaders flexible, responsive, appropriate, and capable military options in an era of ambiguous peace. Highly capable, multi-mission surface warships – the right ships, in the right numbers, in the right place at the right time – are vitally important to future U.S. security needs.

GLOSSARY

AAW	Anti-Air Warfare
ARG	Amphibious Ready Group
ASuW	Anti-Surface Warfare
ASW	Anti-Submarine Warfare
ATF	Amphibious Task Force
BB	Battleship
BUR	<i>Bottom-Up Review</i>
CG	Guided Missile Cruiser
CGN	Nuclear-powered Guided Missile
CONUS	Continental United States
CVBG	Aircraft Carrier Battle Group
DD	Destroyer
DDG	Guided Missile Destroyer
DoD	Department of Defense
DoN	Department of the Navy
DPG	Defense Planning Guidance
FF	Frigate
FFG	Guided Missile Frigate
HM&E	Hull, Mechanical and Electrical
IDC	Inter-Deployment Cycle
IMA	Intermediate Maintenance Availability
ISR	Intelligence, Surveillance, Reconnaissance
JCS	Joint Chiefs of Staff
JHU/APL	Johns Hopkins University/Applied Physics Laboratory
JMAG	Joint Multi-Warfare Analytical Game
OPTEMPO	Operational Tempo
PERSTEMPO	Personnel Tempo
MCM	Mine Countermeasures
MIO	Maritime Intercept Operations
MRC	Major Regional Conflict
NSFS	Naval Surface Fire Support
ONI	Office of Naval Research
OPLANS	Operational Plans
PSI	Pounds (of pressure) per Square Inch
SCFRS	Surface Combatant Force Requirements Study (1988)
SCFLS	Surface Combatant Force Levels Study (1993-94)
SLOC	Sea Lines of Communication
SRA	Selected Restricted Availability
SWDG	Surface Warfare Development Group
IAD	Theater Air Defense
TAR	Turn-Around Ratio
TBMD	Theater Ballistic Missile Defense
TLAM	Tomahawk Land Attack cruise Missile
VLS	Vertical Launch System

Commander Command:

Navigating the Selection Board successfully

Editor's note: The following letter was sent to commanding officers by the president of the recent FY-95 Commander Command Board, RADM W.H. Wright:

Dear Captain,

Let me share with you some impressions from the most recent Commander Command Board. My goal in doing so is to assist you in performing your critical role as the principal career advisor to your wardroom and to ensure you have current and accurate information available concerning the most important decision we make as a community — determining who will command our ships.

Several items stood out as we reviewed the 600 records before the Board:

FITREPS - Board members were often frustrated in their attempts to determine who stood out within various competitive groupings. If there is no clear breakout at the Department Head level, it was very difficult to support a case for that officer to be considered among the "best qualified" for command. As a Commanding Officer you must make the hard decision to clearly identify the stand-out that should go on to command. No apparent breakout creates a dilemma (in an era of inflated fitreps) where the perception of ambiguous wording can take negative overtones.

Letters to the Board - Every officer being considered has the right to communicate with the Board by letter, and these letters are briefed as part of the officer's record. Many of these letters are very straight-forward and simply ensure that the most recent fitness reports, pictures or awards are made part of the record to be reviewed. Unfortunately, we also saw many letters that were used as a vehicle to highlight an area which did not need highlighting and ended up raising questions which only "muddled the waters." Advise your officers to think carefully prior to send-

ing a letter to the Board and ensure the letter is used to clarify an issue in the record which truly requires clarification. Recommend contacting the commander detailee, when in doubt.

Tie breakers - Many times in the Board's deliberations, we had to look for indicators beyond the expected performance at sea as an Executive Officer, Department Head and Division Officer. The growing importance of Joint Duty and JPME is obvious, and the officers who also performed well in the joint arena were viewed favorably during Board deliberations. Having an advanced degree, which increased an officer's value to the Navy, was also viewed as a big plus in a record. The combination of an up-to-date picture and high PRT score was noted during the brief and viewed positively. Those officers with excellent performance records, but who could not meet Navy height-weight standards still do not fare well in the competition for the highly visible leadership position of Commanding Officer.

As the Board sought to determine who was best qualified among the outstanding candidates, it was not only the quality of the at-sea performance that mattered, but the time spent at sea as well. Complex, follow-on sea tours on afloat staffs or early sea tours (second tours at sea as Division Officer) beyond the standard career path sent a clear signal to the Board that the officer was hungry for command. Generally, officers who fit into this category did quite well in the selection process.

Command - The Board invariably commented favorably about officers who sought-out early command and served as Lieutenant Commander COs. Those officers who took the risk and the challenge of command at sea early did extremely well in the selection process. Command is the essence of our profession and those who understand that early tend to reap the benefits later in their careers.

Shore duty - We were not looking for officers who have never been ashore

but we did look for those officers who went ashore and produced some real value-added experience for the Navy. Getting experience either in Washington or elsewhere, added significantly to the career portfolio. Following up a post-graduate degree with a sub-specialty utilization tour makes sense for the Navy and the officer, and the Board looked hard for areas of proven expertise in a wide variety of fields.

Women at sea - One aspect of the decision to open up combatants to women we need to follow up on carefully is ensuring we provide for lateral movement from the CLF community into CRUDES and AMPHIBs. We have a number of truly outstanding women officers who "grew up" in CLF ships and tenders and are now faced with a dramatic drop in the size of the CLF/tender force. The Board believed that a strong effort to mainstream those women with extensive CLF background will be required to diversify their career portfolios, thereby ensuring they remain competitive for command. Also, this diversification will ensure competitiveness and enhance the prospects for success in command. This issue of diversity is vital for the entire community, not just for our women. The more breadth you bring to the table, the better your chances.

Some final thoughts. I remain convinced that our process for determining who is selected for command is an extraordinarily fair one. Senior officers on the Board brought an extremely wide variety of experience, afloat and ashore, as they deliberated painstakingly over each record. Our true bottom line was clear — *demonstrated, competitive performance in tough jobs, at sea and ashore.*

I trust you will find this letter useful, if for no other reason than to reinforce what you may already be saying, based upon your own experience. I encourage you to contact the Head of Commander Assignments - CAPT Bob Conway (PERS-410), if you have any questions or comments.

1993 Equal Opportunity/Sexual Harassment Study

by VADM Skip Bowman

Editor's note: As the Navy approaches the one-year anniversary of embarking women aboard surface combatants, Surface Warfare Magazine would like to pass on a well-deserved Bravo Zulu to the Sailors and Marines at sea who are making this important transition work. The following is a message from Chief of Naval Personnel, VADM Skip Bowman, which highlights the results of the Navy's latest Equal Opportunity/Sexual Harassment (NEOSH) Survey.

The NEOSH survey was mailed October 1993 to 9,537 Naval personnel. Analyses were conducted to assess the current perceptions of equal opportunity within the Navy to identify occurrence and forms of sexual harassment, and to identify trends with respect to the previous surveys conducted in 1989 and 1991. Overall, the results are very encouraging. This survey reveals that we're headed in the right direction in eliminating all forms of discrimination and sexual harassment from our Navy. Though there are still some areas of concern, I would like to commend each of you on the positive trend.

Sexual harassment

The latest survey shows discrimination and harassment have decreased overall. The number of enlisted women who say they have been harassed dropped 25 percent from the 1991 survey. That figure dropped 40 percent for female officers. More importantly, the survey shows that across the board, 25 percent more Navy people believe their commands are taking equal-opportunity complaints seriously, which is reflected by reduced sexual-harassment rates for all groups.

More personnel agreed in 1993 than in 1991 that sexual harassment training is being taken seriously and that policy is being enforced at their com-



Sailors in today's Navy are working hard toward a future without discrimination.

mands. Also, greater percentages of our people indicated their belief that those who engage in sexual harassment will not get away with it.

Although the number of women who say they have been harassed has decreased since 1989, the number of enlisted women who reported telling their harassers to stop the harassing behavior has increased from 60 to 75 percent. This indicates that our Navy rights and responsibilities training has been effective, and the level of confidence has increased among women in both reporting harassing behaviors and stopping it when it first occurs. Additionally, the percentage who did not file a grievance (because their other actions to stop the harassment worked) also increased from 42 to 59 percent. A similar pattern was found for women officers. Also, enlisted women were less likely in 1993 than in 1991 to be deterred from filing a grievance by the belief that nothing would be done.

Equal opportunity

All groups surveyed had generally positive perceptions of the Navy's equal opportunity climate. On a scale of one to five, the average response was between four and five ("agree" and

"strongly agree"). This means, on the average, that Navy people agree or strongly agree that they have an equal chance to serve, learn and progress regardless of race or ethnic group. We are moving steadily toward our goal of an environment where we all can truly "be all we can be" without concern for our color, gender or parents' nationality. (I recently received a letter from a minority officer in the fleet who echoed this sentiment. The officer noted that all our minority recruitment efforts are for naught, if our day-to-day working environment doesn't encourage the full growth and participation of all our Navy team members.)

While important differences continue to exist between blacks' and whites' perceptions of our EO climate, the trend in most areas has improved. Hispanic perceptions have also become more positive, and are similar to those of whites.

Black enlisted personnel perceived there was less racial discrimination at their commands than in previous years. The gap between white and black male officers' perceptions of discrimination occurring at their command also narrowed from the 1991 survey.

There was a significant increase in attendance at the Navy's rights and responsibilities workshops and fraternization training for both officers and enlisted, compared with 1991. There was an overall high level of support for the Navy's fraternization policy.

Looking ahead

We've made measurable progress in the right direction, but there are a few areas where additional emphasis is needed:

- Improve black women's perceptions of equal opportunity in the Navy. We need to learn more about our lack of progress in this area.

- Address the perception held by minority personnel that there are differences in discipline based on race. We

need to educate Sailors on what is working — that discipline awarded to personnel, regardless of race, is consistent and fair. We also know, however, that minorities experience NJP and courts martial more frequently than their majority counterparts. This is a problem shared by all services and is consistent with previous NEOSH surveys. We will continue to investigate the underlying reasons for this.

- Reduce sexual harassment rates among lower paygrades, the very Sailors most likely to be harassed.

- Hold Navy contractors accountable. More women officers reported they were harassed by contractors/civilian employees than in previous surveys.

- Reduce the rate of rape and sexual assault. Though relatively low, the rate is similar to previous surveys. We need to get the word out to our people that a sexual assault/victim intervention program has been established to assist victims. We have developed and will soon be distributing written material and videos on sexual assault and rape prevention and awareness.

I am asking each and every Sailor to adopt a "zero-tolerance" attitude against all forms of discrimination. I know that's a tough challenge. But it is no tougher than the one we faced a few years ago when we sought to eliminate rampant drug use from our ranks. Today's Navy is virtually drug-free as a result of that all-hands effort. We can do the same to eliminate discrimination and sexual harassment.

How do we get there? As I said at the outset, we already have made a good start. The signals are positive. Sailors feel commands are taking reports of discrimination more seriously. Responsibility and accountability will continue to play a key role. When Sailors feel they can trust their chain of command, and when that chain of command takes action on complaints, we move forward toward our goal. I commend you; We've been doing that.

Now, just like we have done in operational and material matters for more than 200 years, we must hold ourselves accountable in the "people" part of the Navy as well. It's not enough just to take action.

MCPON's advancement tips

Editor's note:

The following letter from Master Chief Petty Officer of the Navy, ETCM(SW) John Hagan, appears in the January-March 1995 edition of Link magazine.

Adancement: it's the ultimate reward for caring, consistently working hard and dedication. The Navy, unlike many civilian work forces, is an upwardly mobile force that not only provides opportunities for continuous advancement, but dedicates tremendous resources to assisting Sailors in their pursuit of advancement.

If Sailors work their jobs and collateral duties to excellence, seek challenging and difficult jobs, meet their sea/shore rotations and continue to learn, they will advance and move quickly from entry-level (recruit) to positions of great responsibility (chief petty officer, warrant, limited duty officer or other commissioning programs).

In industry, people often work the same entry-level, assembly-line job for an entire career. While they get increases to their hourly wage and benefits package, they almost never get the opportunity to advance into leadership jobs. Sailors, on the other hand, can quickly move into leadership positions with greater responsibility and challenges. With advancement, comes increased pay and benefits and enhanced pride and prestige.

"But what do I need to do to maximize my chances for getting advanced?" Sailors often ask me in letters and when I visit them in the Fleet. The buzz words response "Sustained Superior Performance" is just not an adequate answer.

Unfortunately, there is no "magic" formula or flow chart that will work as a guarantee to advancement for all Sailors. You can, however, maximize your potential to get selected for advancement to E7, E8 or E9, or to get a commission by following a few proven guidelines. It's easy to advise Sailors about what they need to do to get advanced through the E6 level. Even in the tightest ratings, Sailors will advance if they consistently cut high scores on the advancement exams. (In some ratings, it might take several years of high scores to gain a high enough final multiple to get advanced.) The bottom line: **STUDY!**

The ranks, E6 and below, are stepping stones to khakis. As such, you must begin well before you become a first class petty officer to prepare for the chief petty officer selection board, or for commission. Here are some points to consider that will help you maximize your advancement potential:

- Do what you have to do to *be the best in your rating.*
- Seek the most difficult jobs at sea or with deployable units, especially those with the opportunity to supervise and lead other people. Ashore, do the same. Seek challenging jobs such as recruit company commander or canvassing recruiter, or other jobs that you know are high profile and have a busy operational tempo.
- To the extent possible, control your duty assignments and stick to your sea/shore rotation. For many ratings, too much Type 3 duty is not good. You must go to a ship, squadron, or deployable unit.
- Get qualified at special watches and other programs.
- Take significant and important collateral duties and work them to excellence.
- Community service and college courses are important and help round out and define our character, but they are much less important than some believe. That Sailor who has served at sea for five years may have had little opportunity for civic involvement or off-duty college work. Selection boards realize this and they score accordingly. It is important to be a Sailor first and a student second in any and all circumstances.

For all of us, Navy life is filled with sacrifices. The most successful often endure great sacrifices to give to the Navy over and over again, job after job. They are the Sailors who should be advanced. The selection boards are looking for them. Seek successful leaders and adopt them as your mentors. Ask them questions, get them to review your record, ask them for advice and then **FOLLOW IT!** Most importantly, ensure that your accomplishments are properly documented on your evaluations and that you regularly check your microfiche and enlisted service record. If there are errors or omissions, correct them.

Plan ahead and do the best you can, no matter what the challenge. Good luck! We are fortunate to serve in a force of opportunity!

SURFACE WARFARE OFFICERS:

Taking care of our own

by CDR Peter Dougherty

To quote the Chief of Naval Operations, ADM Mike Boorda, "The end of the drawdown is near...emphasis is shifting from downsizing to retention." No place in the Navy does this ring more true than in the surface warfare community.

Not unlike other armed services, the Navy has experienced several years of uncertainty...Number of ships? Base closures? Promotion opportunity? Department head, executive officer, command opportunities? It seemed the only *certainty*, at least for those of us on sea duty, was that we were going to keep the plants lit off and our bags packed. Now that the end of the drawdown is in sight, and a more stable future is ahead, allow me, as the SWO Community Manager, to pass on what I see is at hand and in the works for today's and tomorrow's SWOs.

Allow me to digress momentarily. Having recently completed an XO tour and seven consecutive years of sea duty, I understand the unique challenges encountered by the SWO brethren. No, it's not easy, and I suspect if it were, most of us would not be here. We thrive on myriad challenges that arise daily. We're all familiar with: the never-empty "in box" and the accompanying feeling that we *must* have forgotten something; the 20-hour stretch of watches, evals, PMS and PQS, only to find when preparing to hit the rack that you're on the boarding team that's just been called away; or when you're just about to enjoy the wardroom lunch with your comrades, the XO walks in and reminds you that you've "got" the meal evaluation. Yes, I've been there (and believe it or not, look forward to returning to sea duty).

"We realized mandated end strength the best we could, with minimal loss in readiness, and for the most part it's over. Unfortunately, we lost some quality people in the process."

Personnel

To reiterate what I have stated before, "No, the sky is *not* falling." In fact, the exact opposite is true, surface warfare is in great shape...and getting better! Yes, we've had to downsize, and no, it wasn't easy. On the personnel side, we lost some fine shipmates. Unfortunately, that is the nature of the downsizing beast. On the flip side, look around (or in a mirror) and you'll see that we've retained a lot of superior officers.

In order to meet congressionally mandated end-strength requirements, the Navy was forced to utilize almost all the tools in its tool box such as: waiving some obligated service requirements; involuntary release of active-duty (IRAD) reserve personnel; temporary early retirement (TERA) and voluntary separation incentive/special separation benefit (VSI/SSB) programs. The only tool not utilized, unlike some services, was the dreaded "pink slip." We realized mandated end strength the best we could, with minimal loss in readiness, and for

the most part it's over. Unfortunately, we lost some quality people in the process.

At present, no "optional" personnel reduction program (i.e. VSI/SSB) for surface warfare officers is anticipated. (If offered, and again it is *not* anticipated, it would be utilized solely as a "shaping" tool to reduce specific, vice accessed year groups.)

Promotion rates are one of the many bright spots for the SWO community. Overall, SWO promotions are sailing along at historic levels and, for the most part, closely match overall promotion opportunity. For newly qualified SWOs the news is especially good: SWO qualified LTjg's are promoting to LT *well above* overall opportunity and most of their counterparts in other warfare communities.

Other surface success stories include equal opportunity (i.e. women at sea). The ambitious task of placing female officers in almost all ship types is progressing better than ever envisioned. To date, more than 165 female surface officers have been assigned to combatants and CVNs alone! Billets include both department head and division officers, with ship types running the gamut from DDGs to CVNs. It's only a matter of time before our first female combatant XOs and COs hit the deck. It's important to note that we've had female SWOs commanding our (non-combatant) ships for many years, and much of our success with gender integration can be attributed to our nearly 20-year experience of having women at sea.

Another area of improvement includes the increase of minorities in our ranks. The SWO community's minority representation increased again in FY 94 to boast the highest number and per-

centage of minority representation of *any* warfighting community, bar none! The bottom line in regards to improving equal opportunity is: SWOs take care of their own.

Force structure

The robust ship de-commissioning program was a tough pill to swallow. However, it's fast pace has slowed significantly. The *end* of this inauspicious era, in conjunction with numerous ship commissionings and the recently announced plan to "save" 15 FFGs, signals a turnaround in the reduction of force structure.

Coincident with this turnaround is the resultant increase in SWO billets across the board. With the increase in ships, opportunity to select for department head and XO is expected to remain at historic levels (80-85 percent and 70 percent, respectively). Commander command opportunity, though previously projected to decrease, has remained steady between 50-55 percent.

Bottom line: the opportunity for all of us to "move up" remains excellent!

Preserving the opportunity for command at sea has been a principal concern during the drawdown. Community leaders realize that to eventually achieve this goal is what being a SWO is all about -- nothing can match it! Our junior officers, highly sophisticated warships and state-of-the-art weapon systems represent the future of surface warfare. And with evolving capabilities, like TBMD, SWOs soon will be fulfilling several new and exciting missions.

Also, let us not forget the incredible opportunity afforded by our smaller craft. Division officer requirements can be fulfilled while you serve as a department head in one of these super crafts, and in the case of PCs...you can be in command while still a LT! In addition, they allow you to broaden your horizons while working with the Naval Special Warfare/Special Operations community (Read more about this unique opportu-



Senior SWO leadership and the CNO are working together to alleviate the effects of downsizing. Every SWO will continue to have a rewarding career as long as he or she performs well.

nity in the article on page 32. If interested, give your detailer a call).

Fleet operations

For those working on underway qualifications, our underway/operations tempo over the last several years has been great! Navy leadership realizes, however, that excessive time away from home can have a negative impact on morale and retention. As evidenced by the amount of coverage PERSTEMPO/OPTempo have received DOD wide, this issue remains at the forefront for not only the surface warfare community, but the Navy as a whole. ADM Boorda is committed to keeping deployments to six months...period! And, as the new world order continues to settle following the fall of the Soviet Union, contingency operations appear to be around for at least the next several years. Again, it's the nature of the beast.

The most viable option, to decrease underway time and to increase quality time at home, appears to be within the "inter-deployment" phase. It is in this area Fleet CinCs are focusing in order to reduce not only underway time, but also time required for onboard training, inspections, assist visits, grooms, etc. We will continue to deploy, and to meet any contingency that may arise. However, emphasis will be on providing significantly increased quality time when

in and around homeport. We should see some proposals in the not-so-distant future.

Compensation

In addition to trying to provide more time at home, DOD/Navy is working hard to better the quality of life for all service members. President Clinton has committed to giving the military the full pay raises allowed by law through 2000. Action is already underway to improve military housing, increase BAQ and start paying a cost-of-living allowance in high-cost regions of ConUS.

Also, the Eighth Quadrennial Review of Military Compensation began working in January. Though mandated to design a new compensation system for the 21st century, Assistant Secretary of Defense for Force Management, Mr. Fred Pang, has said the panel might play a role in more immediate reforms. Almost every facet of military compensation is being reviewed and scrutinized to ensure we, families included, receive fair compensation for everything we do. Bottom line: We are *putting people first*!

In summary, the drawdown is nearly complete. We've made it over the "hump." Concern is visibly shifting from how and where cuts will be made to providing a solid career progression for all and increasing quality of life. Senior SWO leadership and the CNO are sensitive to every concern and are working in concert to alleviate any residual effects of downsizing. As always, every SWO will continue to have a rewarding career as long as he or she continues to perform well. The cliché "sustained superior performance" remains a SWO standard. Without question, the future of surface warfare is shining brighter than ever!

Editor's note: CDR Dougherty recently reported to BUPERS from his XO tour aboard USS Elrod (FFG 55).

Mine warriors exploit unfamiliar domain

... technologies for the mine warfare community

by LT Jon P. Walman

Mine warfare forces have moved into "very shallow" water to counter the ever-dangerous mine threat and to close the gap between the sea-land battlespace. Exploiting this unfamiliar domain has led to changes in mine warfare policies, development of new technologies and employment of new warfare tactics.

No other warfare area has seen more dramatic change recently than mine warfare. Since the end of Operation Desert Storm less than four years ago, the mine warfare community has: relocated its headquarters from Charleston, S.C. to Corpus Christi/Ingleside, Texas; restructured its support network to improve coordination of mine warfare activities and to expedite acquisition of new systems; and completely revisited its warfighting approach as a result of the Navy's emphasis on littoral/expeditionary warfare.

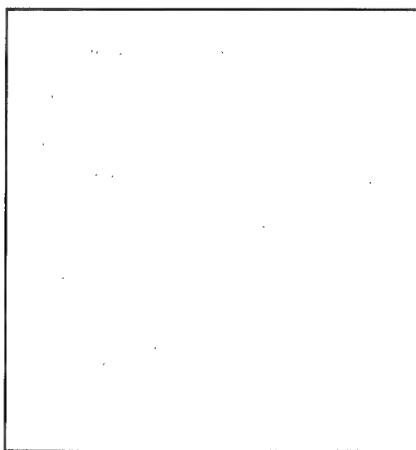
VSW challenges

Adapting to very shallow water (VSW = 10-40 feet) has been a challenging task for today's mine warriors because of adverse environmental conditions.

Mine countermeasures (MCM) operations in VSW are extremely restrictive, according to LT Jim Berdeguez, oceanographer assigned to Commander, Mine Warfare Command (COMINEWARCOM). "Although the



An EOD diver places an explosive charge on a moored Iraqi (Lugm 145) mine during Desert Storm.



problems we encounter in very shallow water are similar to those facing anti-submarine forces, ours are more severe because MCM forces operate much closer to shore," he said.

"We're dealing with a whole new rule book in very shallow water," said AG1 Richardo Amesquita of Mobile Environmental Team (MET) Detachment, Jacksonville, Fla. "Rapid fluctuations in wa-

ter temperature, absorbent bottom types and uneven bottom contours, low water salinity caused by fresh water flow and high noise levels caused by increased surface reverberation, biological activity and shipping traffic are all unfavorable *acoustic* conditions. Also, river runoff and excessive wave action cause murky water which limits *visibility*."

As water depths get less than 40 feet, there are some *physical* limitations as well. Many shipboard MCM systems are not designed to

operate in VSW where ships are also at risk. Consequently, Navy officials are developing a number of *organic* off-board systems that can be deployed from surface or subsurface units.

Building organic capability

The diverse nature of mine threats and environmental conditions demands that mine countermeasures include an unusually high mix of unique capabilities. Dedicated surface and airborne MCM assets cannot satisfy *all* MCM requirements according to LCDR Bill Flynn, an MCM requirements officer in the Expeditionary Warfare Division (N85) of OPNAV.

"The Gulf War showed us that Navy and Marine Corps operations are hampered by a lack of organic mine reconnaissance systems," LCDR Flynn said. "In response, we are developing a family of mine *reconnaissance* systems that

Surface Warfare

will be organic to individual ships or the Naval expeditionary force which will meet the wide variety of mine threats, water regions, environmental conditions and tactical situations we are faced with."

Some of the organic mine reconnaissance systems (See Figure 1) under development include:

- **UUVs**—unmanned underwater vehicles. Deployed from submarines and possibly surface ships, these systems are being developed to meet the critical need for clandestine mine reconnaissance.

- **AQS-20**—airborne towed mine-hunting sonar — upgrade to AQS-14 that will provide a 10-fold increase in area coverage.

- **RMS/RMOP**—Remote Mine-hunting Systems. Launched and recovered from surface combatants, RMS will provide a wide-area mine reconnaissance capability (See page 16).

- **ALMDS**—Airborne Laser Mine Detection System will use laser-based technology to detect mines from helicopters.

- **MCAC**—Multi-purpose Craft Air-Cushion. LCAC variant able to hunt and sweep mines.

Two other innovative MCM programs include:

- **SABRE**—Shallow Water Assault Breaching System uses explosives to breach wide holes in minefields in VSW and "surf zone" regions.

- **Mk 7 MMS**—Marine Mammal System detachments use specially trained dolphins to locate, mark and neutralize mines (See page 16).

"To be operationally effective in both deep and shallow-water MCM, we require many different capabilities," said

Organic Mine Reconnaissance Systems

Deep (>200')	Shallow (200' to 40')	Very Shallow (40' to 10')	Surf Zone (10' to HWM)	Craft Landing Zone (Beach)
NMRS/LMRS UUVs	→			
AN/AQS-20 Sonar	→	→		
RMS/RMOP	→	→		
Airborne Laser Mine Detection Systems (ALMDS)	→	→		
Mine Reconnaissance Undersea Vehicle (MRUV) UUV	→	→	→	
MCAC (Will also provide organic sweeping and SWMCM support)	→	→	→	→

Bottom Line: No "Silver Bullet" in Mine Recon / Surv - Many technologies/systems required to meet challenging environments.

Figure 1: Organic mine reconnaissance systems

RADM Richard D. Williams III, Program Executive Officer for Mine Warfare (PEO-MIW). "There is no 'silver bullet' that we can count on to do everything we must do in mine warfare.

"Reconnaissance systems will help us avoid the mines, but we also need to stop the miner...to stop mines from going in the water in the first place. We must achieve much greater *intelligence* and *surveillance* capabilities. This will require interlocking communications with the intelligence community as well as developing a new sea mine that can be used for offensive mining," he said.

Improving readiness

In addition to the many innovative technological programs underway, a major restructuring of the mine warfare organization has led to improved tactical training for mine warriors.

According to RADM John D. Pearson, COMINELWARCOM, the recent move to Texas has resulted in a significant increase in training efficiencies and overall readiness.

"Collocating our resources has afforded us a dedicated MCM training facility, space to move and expand our training center and proximity to the research and development center at Panama City, Fla. And despite our distance from the fleet, we are integrating with them through deployments, fleet

exercises and development of interactive, dual-coast minefield exercises using real minefields laid in the Gulf of Mexico and mirror minefields on each coast," RADM Pearson said.

Known as the "Center of Mine Warfare Excellence," Naval Station Ingleside is home to 15 mine countermeasures (MCM) and coastal mine-hunter (MHC)

ships. In the near future, the Navy plans to move all EOD detachments to Ingleside, joining the two EOD/MCM units there now. Also, there has been some discussion about moving the Navy's MH-53E aviation mine countermeasures squadrons to Corpus Christi Naval Air Station, which is where COMINELWARCOM is located.

In addition to collocating its resources, COMINELWARCOM recently issued important organizational changes that impact command relationships. COMINELWARCOM — who is the operational commander for surface, aviation and EOD MCM units — now reports to Commander, U.S. Surface Naval Forces, Atlantic instead of Commander in Chief, Atlantic Fleet for administrative/support purposes regarding surface forces.

As Commander Naval Surface Group Ingleside, RADM Pearson also acts as the group commander for all three MCM squadrons (no longer called groups). All MCM/MHC-class ships report operationally to MCMRON ONE or TWO (tactical command staffs) for intermediate/advanced training and deployments, while reporting administratively to MCMRON THREE (readiness command staff) for basic training. Consequently, RSG Ingleside has been disestablished.

These changes, which coincide with

Coordinated team effort

```

graph TD
    Title[MCM MISSIONS AND FUNCTIONS]
    Strategy[STRATEGY]
    Scenario[SCENARIO]
    MCM_Missions[MCM MISSIONS]
    MCM_Functions[MCM FUNCTIONS]
    Connectivity[CONNECTIVITY & INTEROPERABILITY]

    Strategy --- DPG[DPG/"FROM THE SEA"]
    Strategy --- PEO[PEO(MI/W)  
PMO 407]

    Scenario --- MRC_E[MRC(E)]
    Scenario --- MRC_W[MRC(W)]
    Scenario --- LRC_N[LRC(N)]
    Scenario --- LRC_FAR[LRC(FAR)]
    Scenario --- MRC_CON[MRC(CON)]

    MCM_Missions --- Port[PORT BREAKIN/OUT]
    MCM_Missions --- Transit[TRANSIT]
    MCM_Missions --- Amphib[AMPHIBIOUS OPERATING AREA]
    MCM_Missions --- Fleet[FLEET OPERATING AREA]
    MCM_Missions --- Admin[ADMIN OPERATIONS]

    MCM_Functions --- Surveillance[SURVEILLANCE]
    MCM_Functions --- C4I[C4I]
    MCM_Functions --- Recon[RECONNAISSANCE]
    MCM_Functions --- Clearance[CLEARANCE]
    MCM_Functions --- SelfProt[SELF PROTECTION]

    Connectivity --- Hunt[HUNT]
    Connectivity --- Neutralize[NEUTRALIZE]
    Connectivity --- Sweep[SWEEP]
    Connectivity --- Nav[NAVIGATION, COMMAND & CONTROL]

    DPG --- Port
    DPG --- Transit
    DPG --- Amphib
    DPG --- Fleet
    DPG --- Admin

    MRC_E --- Port
    MRC_E --- Transit
    MRC_E --- Amphib
    MRC_E --- Fleet
    MRC_E --- Admin

    MRC_W --- Port
    MRC_W --- Transit
    MRC_W --- Amphib
    MRC_W --- Fleet
    MRC_W --- Admin

    LRC_N --- Port
    LRC_N --- Transit
    LRC_N --- Amphib
    LRC_N --- Fleet
    LRC_N --- Admin

    LRC_FAR --- Port
    LRC_FAR --- Transit
    LRC_FAR --- Amphib
    LRC_FAR --- Fleet
    LRC_FAR --- Admin

    MRC_CON --- Port
    MRC_CON --- Transit
    MRC_CON --- Amphib
    MRC_CON --- Fleet
    MRC_CON --- Admin

    Port --- Surveillance
    Port --- C4I
    Port --- Recon
    Port --- Clearance
    Port --- SelfProt

    Transit --- Surveillance
    Transit --- C4I
    Transit --- Recon
    Transit --- Clearance
    Transit --- SelfProt

    Amphib --- Surveillance
    Amphib --- C4I
    Amphib --- Recon
    Amphib --- Clearance
    Amphib --- SelfProt

    Fleet --- Surveillance
    Fleet --- C4I
    Fleet --- Recon
    Fleet --- Clearance
    Fleet --- SelfProt

    Admin --- Surveillance
    Admin --- C4I
    Admin --- Recon
    Admin --- Clearance
    Admin --- SelfProt

    Surveillance --- Hunt
    Surveillance --- Neutralize
    Surveillance --- Sweep
    Surveillance --- Nav

    C4I --- Hunt
    C4I --- Neutralize
    C4I --- Sweep
    C4I --- Nav

    Recon --- Hunt
    Recon --- Neutralize
    Recon --- Sweep
    Recon --- Nav

    Clearance --- Hunt
    Clearance --- Neutralize
    Clearance --- Sweep
    Clearance --- Nav

    SelfProt --- Hunt
    SelfProt --- Neutralize
    SelfProt --- Sweep
    SelfProt --- Nav

    Hunt --- Nav
    Neutralize --- Nav
    Sweep --- Nav
  
```

MCM MISSIONS AND FUNCTIONS
 STRATEGY: DPG/"FROM THE SEA"
 PEO(MI/W) PMO 407
 SCENARIO: MRC(E), MRC(W), LRC(N), LRC(FAR), MRC(CON)
 MCM MISSIONS: PORT BREAKIN/OUT, TRANSIT, AMPHIBIOUS OPERATING AREA, FLEET OPERATING AREA, ADMIN OPERATIONS
 MCM FUNCTIONS: SURVEILLANCE, C4I, RECONNAISSANCE, CLEARANCE, SELF PROTECTION
 CONNECTIVITY & INTEROPERABILITY: HUNT, NEUTRALIZE, SWEEP, NAVIGATION, COMMAND & CONTROL
 CORE: HUNT, NEUTRALIZE, SWEEP
 SUPPORT: NAVIGATION, COMMAND & CONTROL

Figure 2

"GOMEX enables us to train like we will fight. It gives U.S. Navy mine warfare forces the opportunity to train as an integrated team prior to working with our allies overseas," said Commodore Richard L. Owens, Commander, Mine Countermeasures Squadron Three. "It also allows us to rehearse NATO procedures that will be used in Blue Harrier."

clude: Naval Special Warfare teams; surveillance/reconnaissance assets, such as MET/MMS detachments and Mobile Inshore Undersea Warfare units; and supporting Marine Corps elements, which take tactical control of a MIW operation when it reaches the craft landing zone.

ship in addressing MIW issues.

Systems/force integration

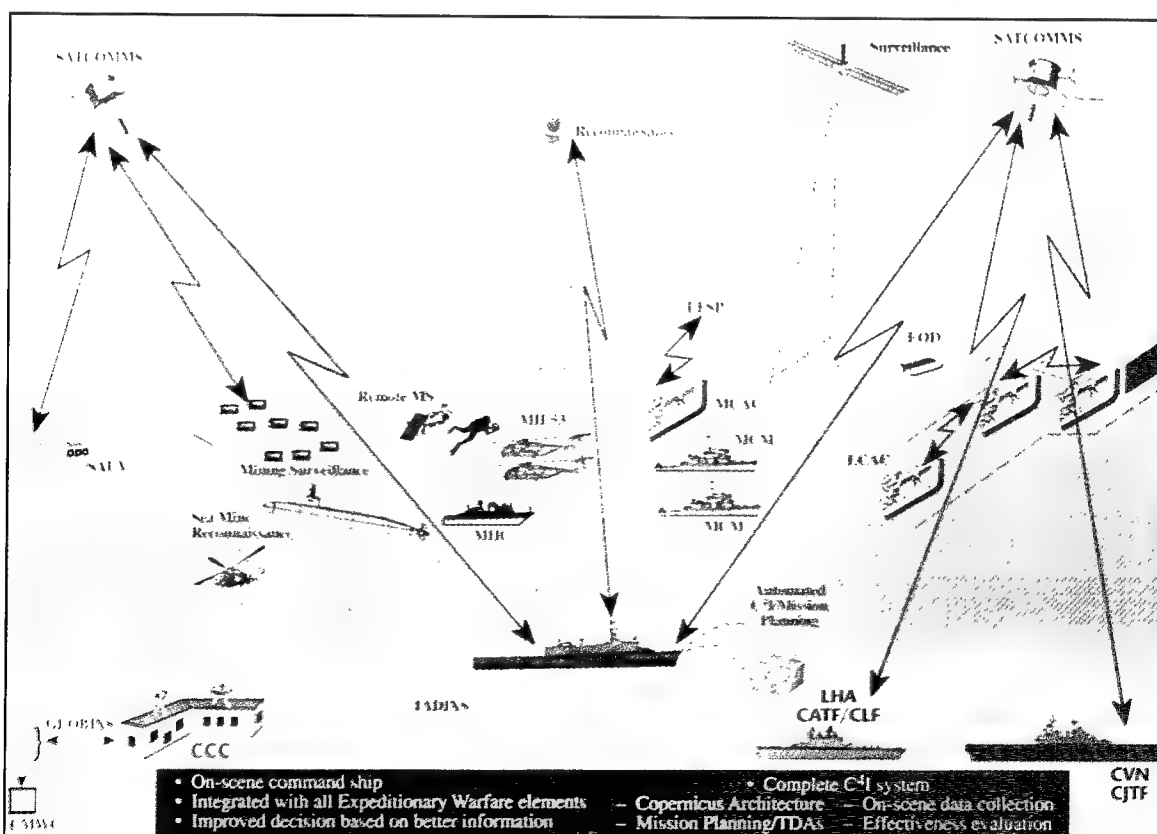
“One of our primary goals is to increase the synergy between MCM units and systems,” said CAPT Larry Kelly, Program Manager for Surface Mine Warfare Systems (PMO-407). “Because mine warfare involves so many different activities, functions (see **Figure 2**) and systems, it

is imperative that we op-
cohesive package. There
enough challenges for the
er of capabilities we pos-
cret is integrate each sys-
nner that accentuates its
satisfies fleet require-

In an effort to improve connectivity among mine forces and other fleet units, Navy officials are planning to provide enhanced C⁴I (command, control, communications, computers and intelligence) capabilities. The “vision” of mine warfare leadership is represented by **Figure 3**.

"It is often difficult to maintain an

Figure 3



overall picture of an evolving mine warfare scenario. Therefore, we must be able to effectively communicate not only internally but also with the rest of the fleet through a system like JMCIS (Joint Maritime Command Information System). Having the capability to relay specific information, such as reconnaissance data, will greatly enhance situational awareness for the battle force or amphibious task force" said CAPT Kelly.

MCM support ship

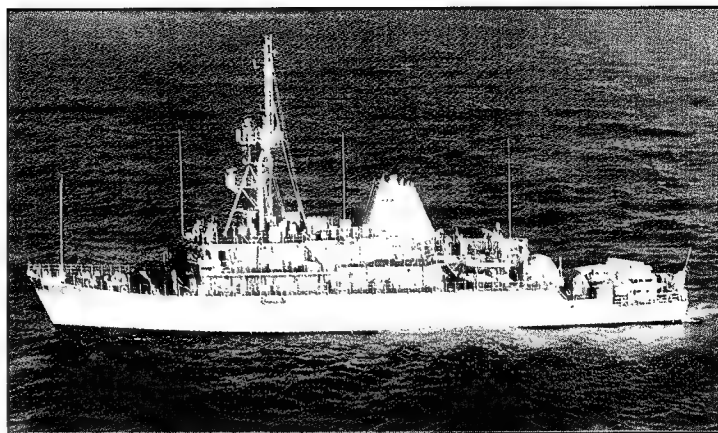
In support of this requirement, the Navy is converting USS *Inchon* (LPH 12) from an amphibious assault ship to a mine countermeasures support (MCS) ship. The 12-month conversion will begin in March in Pascagoula, Miss.

Upon completion of her conversion and transfer to Ingleside, *Inchon* will be used to conduct coordinated AMCM, SMCM and EODMCM operations. With an embarked MCM squadron commander and staff, the ship will provide integrated command and control for all MCM forces. As a permanently converted and dedicated MCM asset, *Inchon* also will provide emergent intermediate-level voyage repairs for MCM ships and aircraft.

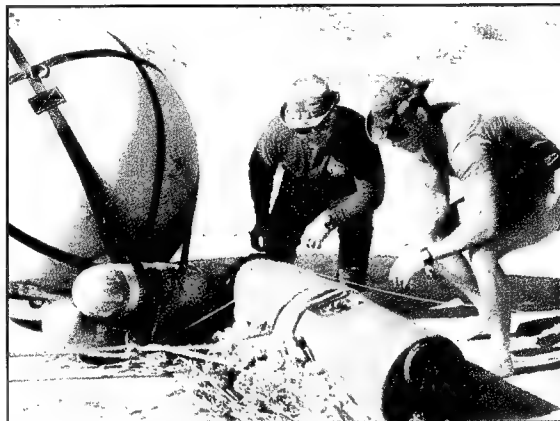
Major configuration changes to *Inchon* will include:

- installing two new cranes, air conditioning plants, boats and davits
- converting USMC troop/stowage space to MCM office/support space
- providing for female accommodations
- remarking the flight deck
- installing C⁴I systems
- installing new and upgraded ship self-defense systems²

Inchon is a good match for MCS mission requirements according to CAPT Kelly. "The *Inchon* conversion offers a shorter acquisition time as well as a lower cost when comparing it with new construction," he said.



USS *Pioneer* (MCM 9) recently participated in GOMEX. (Photo by LT J.P. Walman)



LT Jerry Stone and BM1(SW) James Drake study a retrieved mine during GOMEX. (Photo by LT J.P. Walman)

Once deployed, *Inchon* will be able to support other forward-deployed MCM ships with replenishment of food, fuel and needed maintenance supplies and by providing critical command and control functions.

"As a result of recent crises, MCM ships have been in high demand overseas," said CAPT Kelly. "Fleet CinCs recognize the value of having MCM assets ready at a moment's notice. Now that some of our MCM ships are forward deployed, the availability of an MCS ship like *Inchon* will be essential to our success in mine countermeasures."

As the Navy moves into the littorals, mine warfare is becoming more dynamic and exciting than ever. Naval leadership is committed to getting it right this time around. Improved connectivity, continued interoperability with joint and combined forces, further integration of assets, and shallow-water tactics and technologies will be the focus of mine warfare for years to come.

Notes 1&2: For more information on both MCM and offensive mine programs

Announcing: Autonomous MCM Systems Symposium

A technical symposium on autonomous mine counter measures systems and applications will be held April 4-7 at the Naval Postgraduate School in Monterey, Calif.

The four-day symposium will discuss the potential use of automated robotics in mine warfare and in the disposal and handling of hazardous waste. Sponsors include the Office of Naval Research, the U.S. Army Center Mine Program, U.S. Marine Corps Amphibious Warfare Technical Center and the U.S. Navy Explosive Ordnance Disposal Technical Center.

The symposium is geared for DOD mine warfare and hazardous materials disposal specialists, technical and laboratory specialists from DOE, EPA, FBI, FDA and the academic communities. Discussions will center on the research and development activities of government laboratories, academic and industrial laboratories.

For more information contact:

Albert M. Bouquins

Visiting Professor of Undersea Warfare (Mine Warfare)

U.S. Naval Postgraduate School (Code UMW)

Monterey, Calif. 93943

Tel. (408) 656-3770

Fax: (408) 656-3679

E-mail: ambouqin@nps.navy.mil

as well as previous organizational changes in mine warfare, refer to the 1994-95 U.S. Navy Mine Warfare Plan.

Dolphin warriors:

Contrasting MCM systems show promise

by LT Jon P. Walman

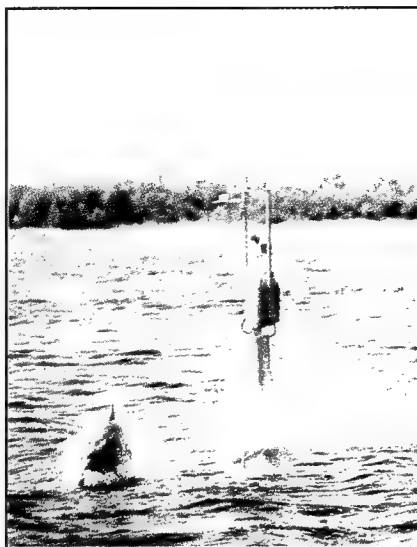
In case you were wondering if this is the latest attraction at Sea World, it's not. The photo (right) shows two of the most promising mine countermeasures (MCM) systems in the U.S. Navy's inventory -- the Remote Minehunting Operational Prototype (also known as RMOP or Dolphin) and the Marine Mammal (dolphin) System.

Remote minehunter

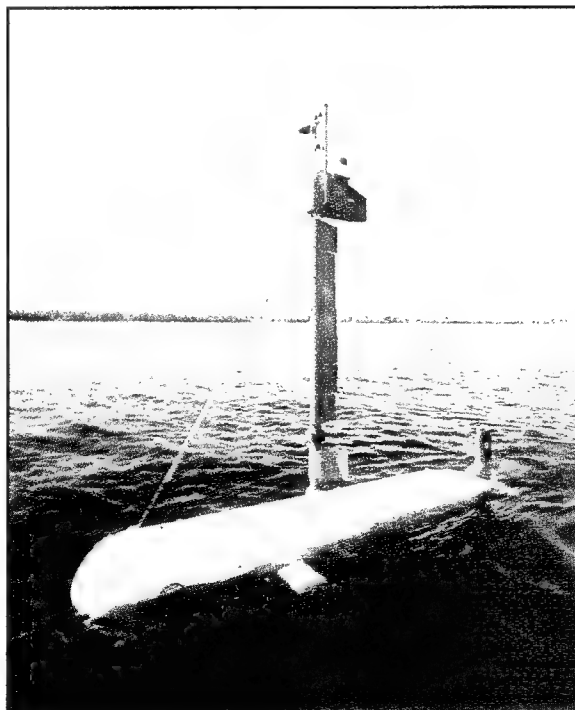
Developed at Coastal Systems Station (Panama City, Fla.) of Naval Surface Warfare Center, Dahlgren Division, the RMOP is a prototype of a semisubmersible unmanned undersea vehicle that may be configured as a remote minehunting system for use from surface ships. RMOP's development was initiated in September 1993 under the sponsorship of OPNAV's Expeditionary Warfare Directorate's Mine Warfare Branch (N852) and Program Executive Officer, Mine Warfare.

The RMOP provides Naval expeditionary forces with an interim organic mine reconnaissance capability.

"This system was designed to provide task forces a cost-effective organic capability to conduct exploratory mine reconnaissance in support of expeditionary warfare operations in littoral environments and other areas of interest," said LCDR Bill Flynn, undersea MCM requirements officer in OPNAV (N852). "These include sea lines of communication, choke points and their approaches, sea echelon areas and other areas where clandestine operation is not a strict requirement."



MMS and RMOP are two promising MCM systems.



The RMOP is a prototype of a semisubmersible unmanned underwater vehicle.

Having successfully completed operational testing in Panama City, the RMOP will be fleet tested for the first time aboard USS *John Young* (DD 973) this spring during Exercise Kernal Blitz off the shores of Camp Pendleton, Calif., according to LCDR Flynn.

The RMOP integrates existing fleet assets and commercial equipment. It can operate for more than 24 hours at five knots on its diesel-powered engine, and its long snorkel enables it to operate in seas up to sea state 5. The RMOP's semisubmersible towing platform serves as a mount for two reconnaissance sonar systems.

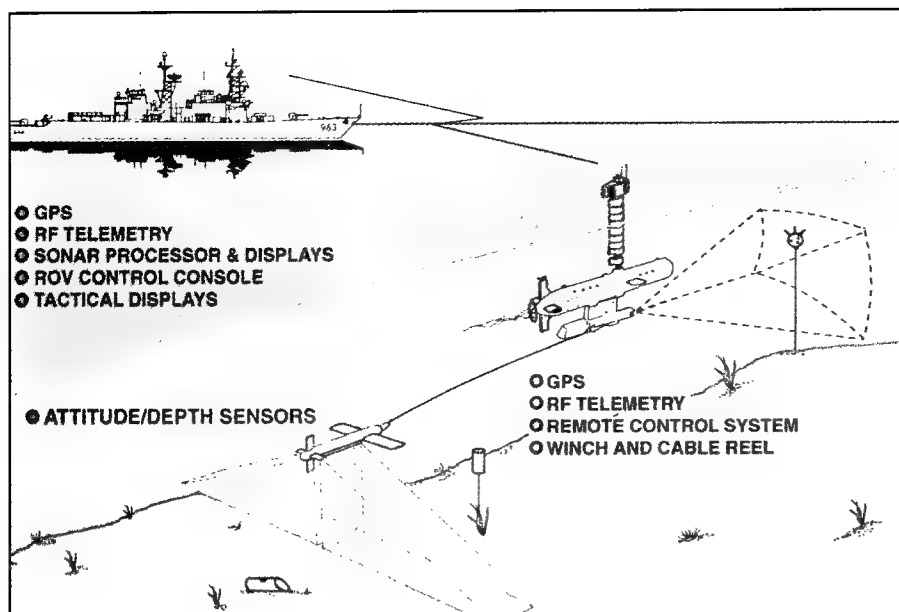
The RMOP tows an AQS-14 airborne mine reconnaissance sonar at variable depths using a winch located in the vehicle keel. The AQS-14 provides a classification capability against bottom and close-tethered mines. A Reson SeaBat 6012 forward-looking sonar, located in the nose of the keel, provides volume-search and near-surface surveillance of mines.

RMOP operation

The RMOP is run from a mission command and display center that uses a TAC-3 computer to perform subsystem integration functions. Mission planning consists of determining search areas, level of reconnaissance desired and run tracks which use waypoints.

The RMOP is operated by a team aboard a host vessel in a semi-autonomous mode using the Global Positioning System (GPS) for navigation. This closed-loop navigation system allows autonomous transit and minehunting track keeping with operator over-ride.

Surface Warfare



RMOP concept of operations

Once the host vessel is positioned in the proximity of the reconnaissance area, the RMOP is deployed by crane over the stern or gunwale. The RMOP operates within line-of-sight range from the host platform. Real-time sonar and mission data is relayed to the command ship via a high-speed radio frequency telecommand link.

After the RMOP is launched from the host platform, it transits to the operational area at a speed of 12 knots. Upon reaching the first waypoint, the vehicle will slow and deploy the AQS-14 sonar to an appropriate depth based on threat type and the environment. The RMOP then returns to operational speed and commences reconnaissance operations.

The RMOP conducts its mission in a semi-autonomous fashion, running preprogrammed tracks. Sonar and mission data is displayed to the operator in real time. The sonar operator identifies and classifies contacts that are mine-like on the sonar displays. Mine-like contacts and their locations are passed to the mission display console for plotting and distribution to the task force commander.

Upon completion of the mission, the vehicle will slow while winching the AQS-14 sonar body into the stowed position. Able to refuel and turn around in less than one hour, the RMOP then transits to the pick-up or refueling location.

Marine Mammal Systems

Mk-4 and Mk-7 Marine Mammal Systems (MMS) are fully operational MCM systems assigned to Explosive Ordnance Disposal (EOD) Mobile Unit Three in San Diego. MMS units employ dolphins -- the Navy's counterpart to military working dogs -- to hunt mines in poor acoustic environments such as shallow water, where sonars do not work well.

MMS dolphins are normally housed in open-water enclosures and worked untethered in the open ocean. Although free to swim away and join wild dolphins, these Navy minehunters choose to stay and work with their handlers and have proved extremely reliable since their first introduction to the Navy in early '70s.

The MMS was developed and is supported by Naval Command, Control and Ocean Surveillance Center (RDT&E Division), San Diego. This organization provides in-service engineering, depot maintenance, animal and handler training and veterinary support.

"Marine Mammal Systems were developed to fill a MCM technology gap that hardware systems have yet to solve," said CDR Rick Nagle, resource sponsor for the MMS program in OPNAV (N852F). "Their repeated effectiveness in finding buried bottom mines and close-tethered mines in poor acoustic en-

vironments, particularly in very shallow areas, makes them a valuable asset to the mine warfare community."

EOD/MMS units are deployable on short notice to almost anywhere in the world as was recently demonstrated during RIMPAC '94. In this exercise, MMS dolphins, personnel and hardware were stationed aboard USS *Juneau* (LPD 10) and proved their effectiveness as an integrated element of the MCM task force.

MMS operations

During exercises like RIMPAC '94, dolphins live in specially designed inflatable saltwater pools kept in a ship's well deck. Operating one at a time, a dolphin and its handlers are deployed on a small boat via the ship's stern gate, then are rapidly transported to the operating area.

Once on station the dolphin is taken through a minefield swimming beside the boat, which moves along a grid of pre-programmed waypoints set in a standard GPS unit. At each waypoint the dolphin is directed by acoustic or hand signal to search for mines with its natural biological sonar. After searching the area, the dolphin reports the presence or absence of mines by pushing a paddle on the side of the boat. When a dolphin reports a mine, the handler gives him a marker that he places next to the mine for later avoidance or prosecution. The dolphin and boat continue to search all grid points until the minefield has been searched.

MMS dolphins continue to prove their versatility and reliability as shallow-water minehunters. This year EOD/MMS units will participate in naval exercises Kernal Blitz, Bell Thunder and

Freedom Banner.

An MMS dolphin neutralizing a tethered mine.



Seahawks fight fire with fire

Hellfire/FLIR key to littoral warfare success

by LT William T. Lawrie

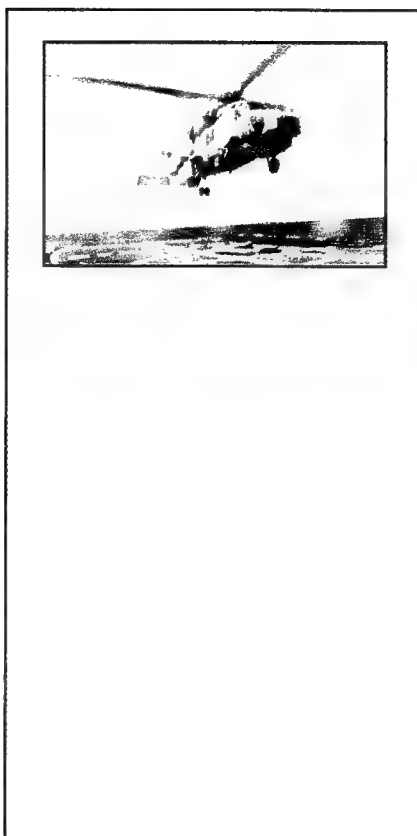
Blowing fast patrol boats out of the water, attacking mine layers, identifying enemy movement at night — all are soon to become new missions for SH-60B Seahawk helicopters. With the introduction of sophisticated weapons/sensor systems specifically designed for littoral warfare, these highly versatile aircraft will be prepared to wreak havoc on anything that gets in their way.

The Navy armed helicopter program's "Enhanced Weaponization Kit" will equip Seahawk/LAMPS MK III helicopters with Hellfire missiles, M-240 machine gun and repositioned forward-looking infrared (FLIR) system. These aircraft enhancements, along with the Penguin AGM-119B missile system (*see SWM Sep/Oct 94:9*), add a whole new dimension to the anti-surface warfare (ASUW) and power projection capabilities of U.S. Navy surface combatants.

According to CDR Tom Vecchiolla, N863 air programs requirements officer, the requirement for an air-to-surface missile capability was addressed in a 1991 Mission Need Statement that identified combat fast patrol boats, mine layers and small craft as major threats to surface combatants in a littoral environment. A CNO-sponsored study determined the Hellfire AGM-114 missile to be the most cost-effective off-the-shelf alternative to counter these threats.

Hellfire

Hellfire is a semi-active, laser-guided missile with a 4.3 nautical mile range and pin-point accuracy. The four-shot Hellfire launcher will be integrated onto the SH-60B's left-hand extended pylon, which also is used for carriage of the Penguin missile. Hellfire missiles are produced by two defense manufactur-



ers: Rockwell International makes the AGM-114B, which constitutes 60 percent of Hellfire missiles; Martin Marietta makes the AGM-114K (or Hellfire II), which constitutes 40 percent of the inventory.

The first Hellfire missile shots from a Navy H-60 were conducted November 2 of last year. Using a USMC MULE as laser designator for the missile, all three test firings achieved direct hits on an at-sea target at a distance of approximately 3.5 kilometers. A government-industry team (consisting of the LAMPS MK III program office—PMA 299, Naval Air Warfare Center in Patuxent River, Md., Sikorsky Aircraft and Rockwell) is conducting an engineering analysis, which is expected to clear

the way for all Navy H-60 helicopters to carry and fire the Hellfire missile.

Enhanced Weaponization Kit

In addition to providing Hellfire missiles, the H-60 Enhanced Weaponization Kit will replace the M-60 machine gun with a 7.62 mm M-240 machine gun. It also will reposition the FLIR system from its starboard bomb rack to the nose of the aircraft, greatly enhancing the helicopter's ability to provide real-time video for surveillance, targeting and laser designation.

Funding for the SH-60B kit will begin in FY 96, with Fleet introduction expected in FY 98. The Navy plans to deliver 56 kits to SH-60B Block I-equipped helicopters in the late '90s. All LAMPS MK III aircraft will be Hellfire-capable when the SH-60R Block II retrofit is completed.

"The added capability of the Enhanced Weaponization Kit will provide an effective way of dealing with small boat threats, providing a force-multiplier to surface combatants as well as varied warfighting options for force commanders," said CDR Vecchiolla. "It also will free up tactical air assets for higher sortie rates toward inland strike missions. Precision-guided missiles give the capability to conduct attacks on surface threats even in the high density shipping traffic common in a littoral environment."

Second-generation FLIR

The armed helicopter program coincides with the development of a new and improved FLIR system. Under a separate program, the new FLIR is considered essential to improving ASUW capability in littoral environments.

According to LCDR Don Davies of the LAMPS program office, the need for

FLIR was addressed as early as 1986. A year later, IBM successfully tested an F/A-18 FLIR system on an SH-60B. As a result, five Hughes AAQ-16 FLIR systems were installed on SH-60B helicopters during Operation Desert Shield/Storm.

The new FLIR, equipped with a laser designator and range finder, is manufactured by the LAMPS MK III system integrator, Loral Federal Systems Company of Owego, NY. The Navy plans to upgrade all shipboard LAMPS MK III datalink systems with airborne FLIR kits. Fleet introduction and helicopter-component deliveries of FLIR are planned for FY 96, with shipboard-component deliveries in FY 95.

The new FLIR will use second-generation FLIR technology, providing three times the performance over first-generation systems. It will provide 24 times magnification and an electronic doubler and quadrupler of the FLIR

image. Its integrated laser designator and range finder are similar to that used in the F-117 Stealth Fighter. In addition, system employment will be significantly enhanced with its nose mounting provided by the Enhanced Weaponization Kit.

"One of the most important aspects of the SH-60B FLIR upgrade is the integration of video downlink capability from the SH-60B to its ship via the unique LAMPS III datalink," LCDR Davies said."

Modifications to all LAMPS MK III air and ship datalink systems will provide previously unavailable real-time video to the ship. This will enhance identification, classification, targeting and battle-damage assessment which can be viewed in a number of shipboard display options: FLIR, radar, FLIR/radar combined, freeze frame, slow motion and playback.

The warfighting contributions FLIR

gives to the surface combatant and its embarked LAMPS MK III helicopter are enormous. In addition to surveillance-related missions, FLIR provides a targeting sensor for Hellfire and Penguin missiles. Additionally, the laser can designate for any laser-guided munitions fired from other platforms.

"The combination of FLIR and Hellfire will give Navy helicopters an unprecedented ASUW capability while giving surface combatants and warfare commanders new strike options against a wide range of threats," said CDR Vecchiolla.

Editor's note: LT Lawrie is in the air programs requirements branch, Surface Warfare Division (N863E2). His previous tour of duty was with HELANTISUBRON Light 45 embarked in USS Fife(DD 991).

Hellfire Specifications

Designation:	Hellfire AGM-114B/K (Naval Variants)
Category:	Air-to-Surface
Length:	5' 4"
Diameter:	7"
Launch Weight:	106 lbs
Max Range:	4.3 NM
Max Speed:	Mach 1.3
Guidance:	Semi-active Laser Homing
Warhead:	14.8 LBS HE (Shape Charge)

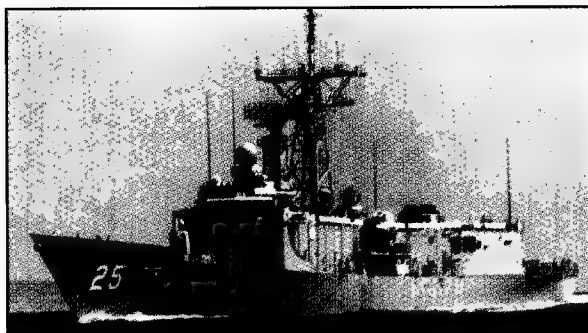
FLIR Specifications

Designation:	AN/AAS-44(V)
Laser Designator/Range Finder	Dark Star Laser (Like F-117 Stealth Fighter)
Magnification:	24X (Electronic doubler and quadrupler)
Fields of View:	3
Weight:	305 LBS
Data Link Video Compression Rate:	8 : 1





'Seeing through clutter'



USS Copeland (FFG 25) recently tested CANDO during Exercise Varsity Player.

CANDO performs flawlessly

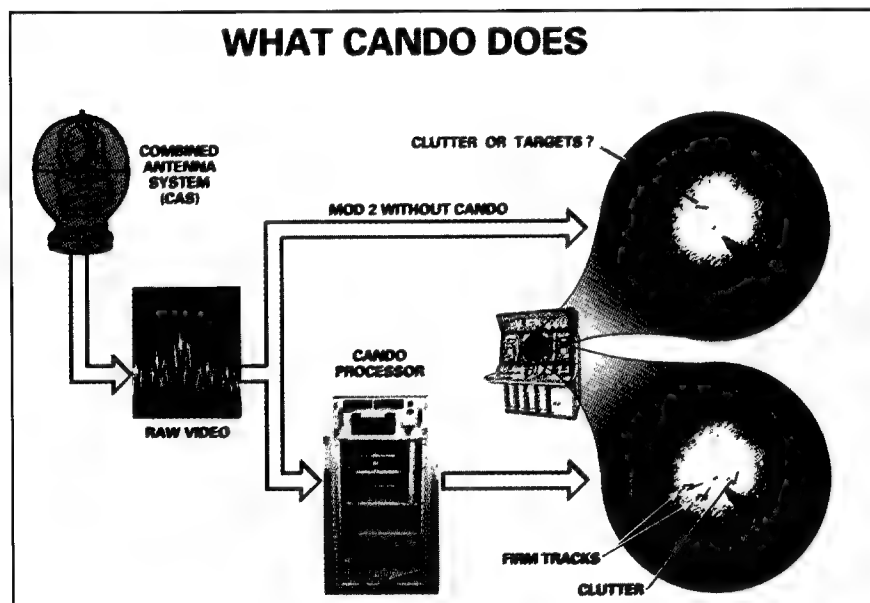
by Doug Clover
and Blade Chapman

FC2 Jones, a.k.a. "Jonesy," has been sitting at his weapon control console for nearly two hours aboard his *Oliver H. Perry*-class frigate. Watching his scope for some sign of air activity, he is acutely aware of the huge responsibility on his young shoulders.

This time it's not an exercise; it's for real. His FFG is on an independent mission, detached from the battle group and close to a hostile shore. Jonesy figures the guys on the bridge can probably just barely see the shoreline. Any second now a surface-to-surface missile could come blazing out from behind those hills, hugging the surface, headed straight for him — littoral warfare! When he joined up, he didn't even know what "littoral" meant!

As the ship slips through the warm waters of the Persian Gulf, the watch team in CIC is at Condition III, ready to defend against enemy attack. "We're on our own now," Jonesy says to himself as he thinks of how far his ship has steamed away from the protection provided by the carrier and all those super-sophisticated cruisers and destroyers. Then he chuckles wryly to himself, "What else is new?"

He watches two tracks on the radar



CANDO ("Can Do!"): Commercial-off-the-shelf Affordable Near-term Deficiency-correcting ORDALT (Ordnance Alteration).

scope. One turns lazy eights to the north while the other moves up the coastline, away from the ship. As the radar paints land clutter down the left side of the scope, a fleeting apprehension comes to mind — would he be able to detect a fast-moving target in this much clutter?

Suddenly his eyes snap to a new "Air Unknown" symbol at the edge of the coastal clutter. As he reaches for the trackball, the weapon system declares

the track as hostile, a fire-control radar locks on and an SM-1 surface-to-air missile is loaded onto the rail.

The watch team is ready. The target moves closer, then at the last moment turns back toward land. Jonesy takes a deep breath. Unlike the past, this time missile engagement wasn't necessary because CANDO detected and promoted the target before anyone recognized it.

ess than two years ago, CANDO was thought of as just another contrived acronym for another wanna-be Navy program. But the days of hypothesizing and talking are over. The CANDO engineering development model (EDM) has been tested at sea during a live firing exercise against actual targets, and it performed flawlessly.

CANDO distinguishes between clutter and movings targets by adding a high-speed processor to the Fire Control System (FCS) MK 92 Combined Antenna System (CAS) radar. It also provides an automatic tracker to supplement the cumbersome process of manual tracking.

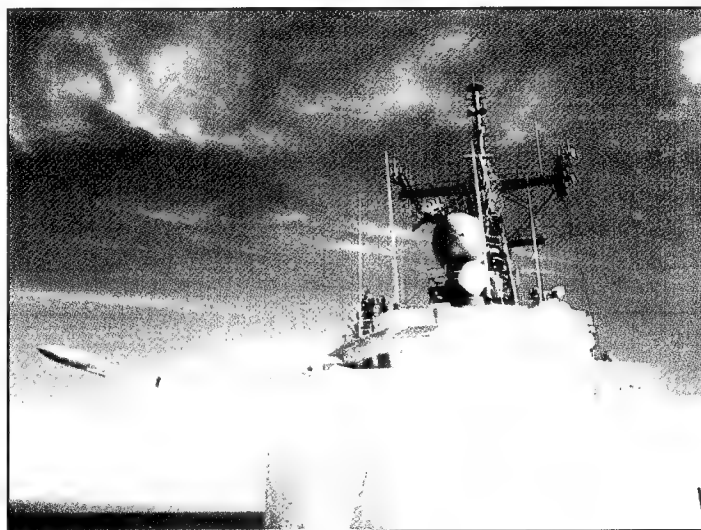
Soon after FCS MK 92 MOD 2 was introduced, it became obvious that it was unable to adequately detect and track small cross-section targets in clutter environments. The upgrade to a MOD 6 version corrected this with a Coherent Receiver-Transmitter (CORT) and an associated Integrated Automatic Detection and Tracking (IADT) System AN/SYS-2(V)2. But fiscal realities limited the MOD 6 upgrade to only 12 of 51 FFGs, the last of which will begin her CORT/IADT upgrade later this year. The remaining FFGs would have to make do with the less-capable MOD 2.

Detects low fliers

CAS CANDO was developed for MOD 2 ships as a means to improve CAS detection and tracking of low-flying, small-cross-section targets in clutter environments. It does not match the performance of a MOD 6 system, but as testing has shown, it provides a significant improvement over the "original" MOD 2. It is all the things its name says it is. It *corrects deficiencies* and was made *affordable* and *near-term* because it uses *commercial off-the-shelf* technology.

System developers made maximum use of commercially available and mul-

tiple-use equipment. Unnecessary military-unique specifications were not imposed, as they have been for similar efforts in the past. Significant opportunities for leveraging from state-of-the-art projects, such as Cooperative Engagement Capability (CEC), reduced development time and cost while yielding an impressive improvement.



A Standard missile (SM-1) is fired from USS *Vandergrift* (FFG 48) during last year's Combat Systems Qualification Trials.

Development testing

Development testing of CAS CANDO began in December 1992 with data collection on the USS *Copeland* (FFG 25). This data was used to prove that new concepts for signal processing would significantly improve detection performance of the MK 92 MOD 2 CAS radar.

In March 1994, USS *Stark* (FFG 31) collected low-elevation exercise data using a preliminary version of CANDO. The engineering development model was completed and tested at Surface Warfare Officers School in Newport during May and June 1994, using the data collected during the March exercise plus real-time radar data. This testing established the feasibility of CANDO and proved its capability to automatically track small cross-section targets at low elevations.

After its installation in *Copeland*, at-sea testing of the CAS CANDO EDM was conducted August 15 and 16 of last year. The live-tracking and missile-fir-

ing exercises were held in conjunction with Exercise Varsity Player at the Pacific Missile Range Facility, Barking Sands, Hawaii.

The testing included participation from two other FFGs with FCS MK 92 MOD 2, but without CAS CANDO. Each time *Copeland* was able to detect and engage the target in the presence of sea clutter when the ships without CANDO were unable to detect it. Over the two-day testing period, *Copeland* detected the target in each of 12 target drone runs while successfully engaging the missile in five out of five attempts.

The common-sense economical principles followed in the CANDO program are not just good ideas; they are mandated by the Secretary of Defense as the new way to do business. They allow the Navy — and all the armed services — to do more with the available dollars

in the shrinking defense budget.

Operationally, CANDO's automated medium-range defense against small, low-flying antiship cruise missiles gives Jonesy and his shipmates the ability to detect incoming threats even when they can't discern them on a cluttered scope.

The Navy is looking at its FFGs with renewed appreciation. Recently, it proposed a plan to retain 15 *Oliver H. Perry*-class frigates previously scheduled for decommissioning by 2001. Each of these FFGs is configured with FCS MK 92 MOD 2. As requirements for forward-deployed Naval forces remain undiminished, Navy leaders recognize the need to retain these very capable ships.

Editor's note: Doug Clover is the Deputy Program Manager for FFG 7/ AAW Weapon Systems (NAVSEA 91W3PB). Blade Chapman is a former naval officer who now works as a defense consultant.

Lightweight Hybrid Torpedo

by CAPT Gary Nelson

The recent shift from the traditional Soviet submarine threat to diesel/electric boats operating in shallow water has posed significant challenges to U.S. Navy's anti-submarine forces.

These challenges, coupled with the rapid proliferation of Soviet-built diesel submarines to countries such as China, Iran and Serbia, are causing Navy officials to focus on developing new ASW weapons and technologies that will effectively counter diesel submarines in littoral environments.

One such example is the lightweight hybrid torpedo concept which offers an *affordable* opportunity to meet the diesel threat by capitalizing on acquisition reform initiatives and leveraging off research, development and procurement investment in the Mk 50, Mk 48 ADCAP (advanced capabilities) and Mk 46 Mod 5 torpedoes.

The lightweight hybrid torpedo concept proposes a marriage of the Mk 50 nose array and transmitter and Mk 46 warhead and propulsion system (See **Figure 1**). It would require the development of a digital receiver and implementation of command and control software that uses commercial off-the-shelf (COTS)-based signal and tactical pro-

cessors running Mk 50 and Mk 48 ADCAP algorithms. It also would require compatibility with current shipboard launchers, fire-control systems and ASW aircraft. A Mk 48 ADCAP fuel control valve would provide greater speed variability to include the low search speed used in the Mk 50. Although maximum hybrid speed and depth would be limited to the Mk 46 envelope, the torpedo would be capable of handling the diesel/electric threat.

Optimized for performance and effective against the fast, deep-diving *Oscar*- and *Akula*-class submarines, the Mk 50 torpedo uses a unique Stored Chemical Energy Propulsion System to provide its speed and depth capabilities. The Mk

50, however, was an inventory casualty of the rapid shift in threat focus and priority. Procurements were terminated in FY 94, resulting in an lightweight inventory composed of less than 20 percent Mk 50 torpedoes.

The Mk 46 Mod 5 torpedo has long been the fleet mainstay for lightweight ASW weapons. Its warhead is effective against the shallow-water threat, and it has a reliable propulsion system. The Mod 5 upgrades introduced in the early 1980s improved performance against the Soviet threat and later Mod 5(A/S) versions provided for shallow-water capability. Additional shallow-water improvements will be introduced via the Mk 46 Mod 5 Service Life Extension Program scheduled to begin fleet introduction in early FY 96.

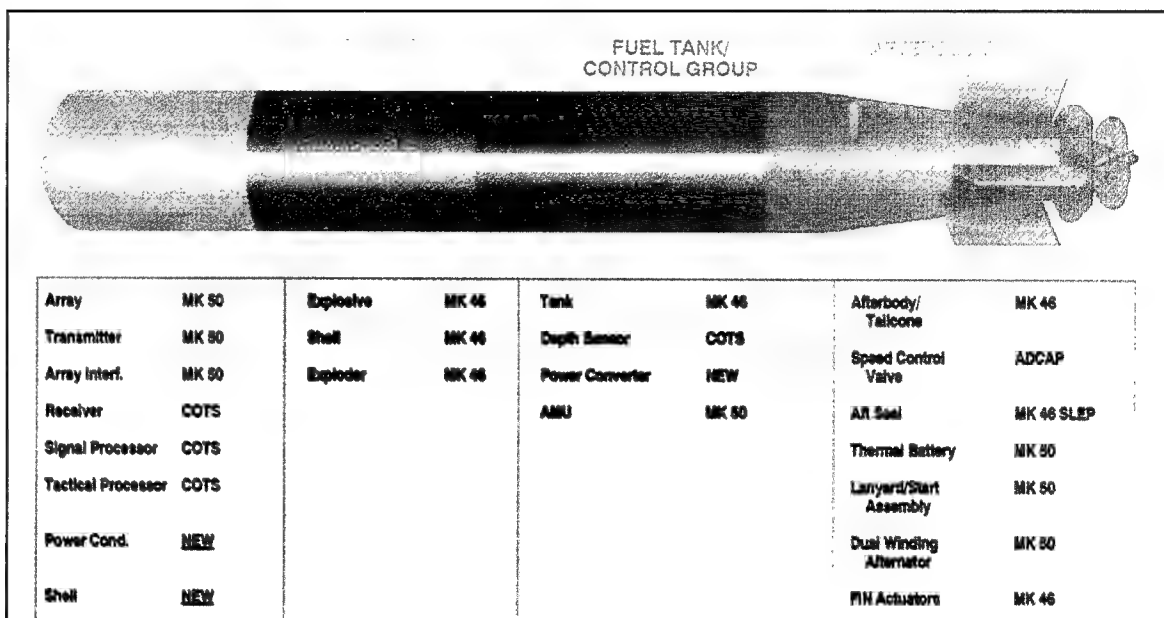
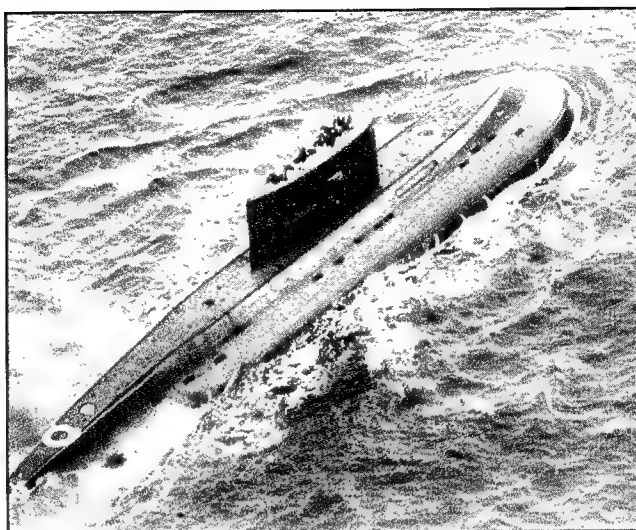


Figure 1: Lightweight hybrid torpedo diagram

The current shallow-water threat is the most demanding environment conceivable for lightweight torpedoes. The complexities of the acoustic interactions of surface and bottom reflections, the absence of high target doppler and the presence of multiple countermeasures or decoys require computer capabilities beyond those achievable with Mk 46 guidance and control upgrades. However, the procurement and life-cycle costs of an inventory consisting solely of the software-based Mk 50 torpedo are not cost-effective. Fortunately, the hybrid concept provides an affordable and achievable solution that addresses challenging shallow-water conditions as well as the technical problems that result from integration of different weapon systems.

Crucial to the hybrid concept was the issue of vehicle control and stability (i.e. Would it swim? Would the Mk 46 control system have enough dynamic range to compensate for the weight gained by substituting the Mk 50 nose array for the Mk 46 array?). To find out, a Control and Acoustic Test Vehicle (CATV), consisting of a Mk 50 forebody and fleet-exercise section and a Mk 46 afterbody,



Former Soviet *Kilo*-class diesel submarines like this one are being exported to China, Iran and Serbia.

was tested on the instrumented ranges at the Naval Undersea Warfare Center Division, Keyport, Wash. Eight in-water tests to determine vehicle dynamics, stability and power generation were conducted successfully, demonstrating the viability of the hybrid concept.

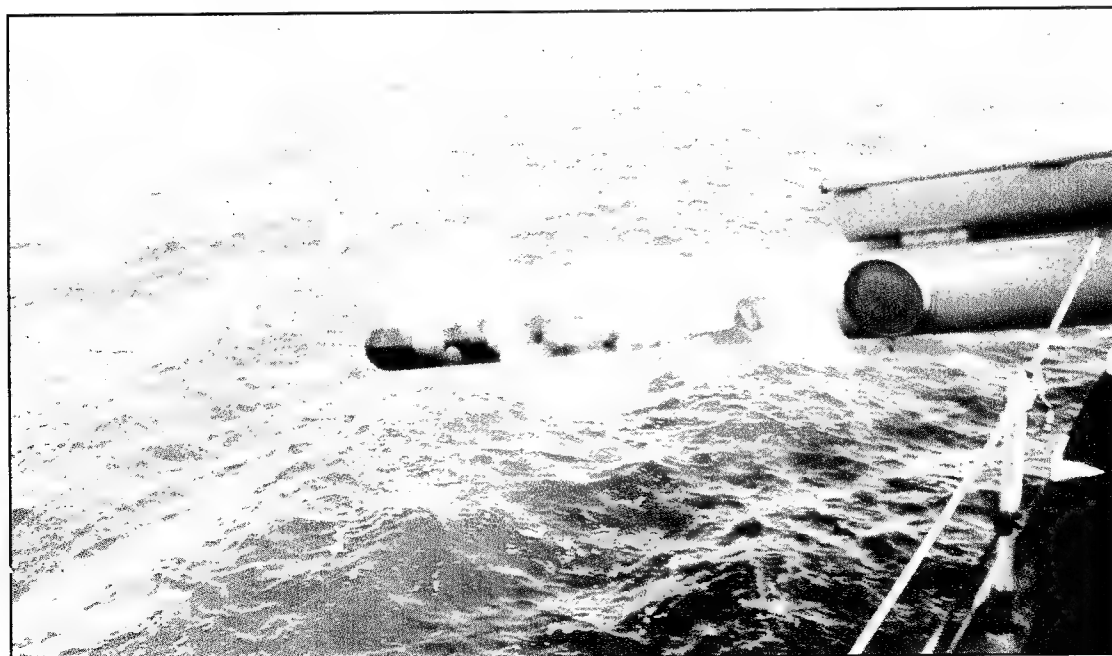
The CATV results and its recently completed cost and operational effectiveness analysis (COEA) form a strong case for a formal acquisition milestone approval in the second quarter of FY 95. Future hybrid efforts will focus on the performance requirements for the

COTS-based processor, software development and additional in-water testing of the CATV. A contract award for production prototype models to be used in engineering analysis and in-water tests is planned for FY 96.

The hybrid program is the first step toward the achievement of *commonality* among undersea weapons. In addition to the common hardware of the hybrid, software algorithms developed for Mk 48 ADCAP shallow-water improvements will be reused. Maximizing commonality among lightweight and

heavyweight torpedoes will yield lower infrastructure and life-cycle costs in the future. Pending formal program approval, the lightweight hybrid torpedo will be a major step in adapting to both the emerging shallow-water threat and the realities of reduced budgets for weapons development.

Editor's note: CAPT Nelson is the Program Manager for Lightweight Torpedoes, PMO 406, and is assigned to the Program Executive Office for Undersea Warfare. His last sea assignment was Commanding Officer of USS Joseph Hewes (FF 1078).



A Control and Acoustic Test Vehicle (CATV) was fired recently during feasibility tests of the hybrid torpedo concept.

Speeding up ASW...

Innovative management system to replace Spruances' manual DRT operations

by Greta Conde

Surface warriors know that anti-submarine warfare (ASW) happens in slow motion when compared to today's immediate "push-button" response common in anti-air and anti-surface warfare. This is caused primarily by sonar and undersea environmental limitations, the drawn-out process of target-motion analysis and antiquated equipment used on some ships to display and evaluate subsurface contacts.

In an attempt to speed up ASW on *Spruance* (DD 963)-class destroyers, Navy officials have developed an automated-contact management system that soon will replace slow, inefficient and labor-intensive ASW operations now performed on the Dead Reckoning Tracer (DRT). The Tactical Decision Support Subsystem (TDSS) will greatly improve the tactician's ability to understand and evaluate a given situation by presenting all available ASW information on a Dual Display Station (DDS).

Scheduled for fleet introduction this year, TDSS will receive data from both organic and non-organic sensors, then process and display it on dual geographical and tactical summary plots. The DDS's two color displays have a keyboard and trackball, allowing two operators to perform separate, but simultaneous TDSS functions.

The TDSS computer will receive data from ownship's sensors through an interface with the MK 116 Mod 7 UYK-43 computer. To obtain external force tactical and environmental data, TDSS will interface with NTCS-A and AN/SQQ-89(V) performance prediction computers via a local area network.



Afloat Training Group Sailors provide fleet evaluation during human interface testing on TDSS Prototype Dual Display Station. From left: STG1(SW) Gary Spraggins, OSC(SW) Bob Clause and OSC(SW) Brian Hebel.

TDSS operators may selectively overlay this data on their respective ASW summary plots.

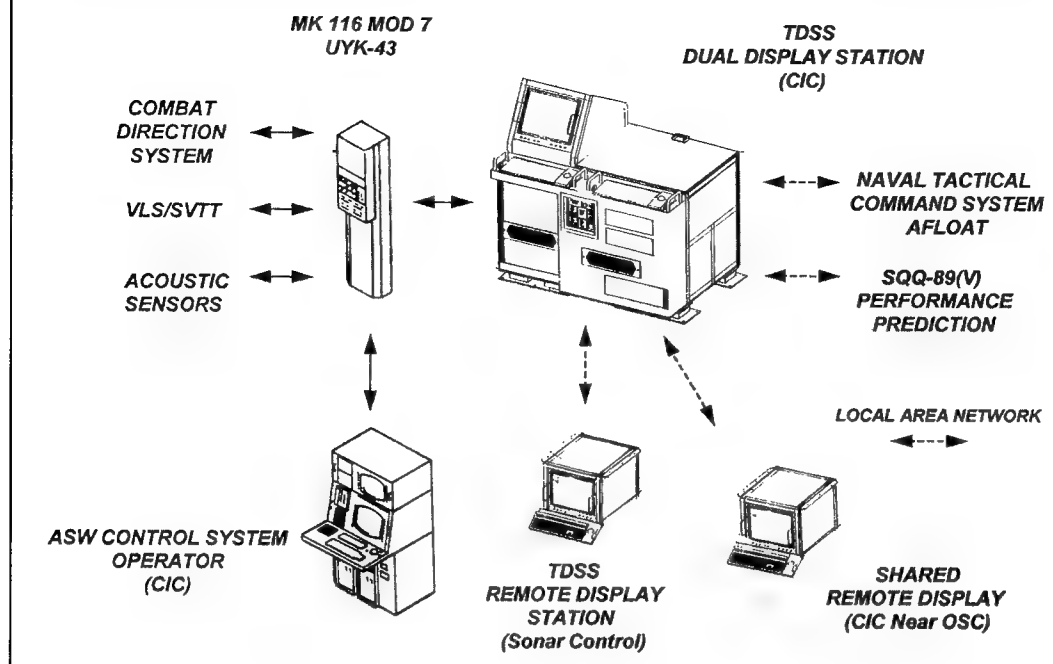
TDSS will automatically perform all manual ASW functions performed on the DRT. This will allow the tactician to focus on the tactical decision-making process instead of spending time collecting and assembling data.

Through its interface with NTCS-A, TDSS will provide a worldwide display that can be reduced to a specific theater of interest or local area of operations. It will be able to display "Screen Kilo" and "Four

Whiskey" grids as well as real-time track data obtained from the ASW Control System(ASWCS). TDSS inputs received from the Combat Direction System, ASWCS and NTDS-A will be represented on the tactical summary plot.

Tactical mission planning will be aided by a visual display of sonar per-

TACTICAL DECISION SUPPORT SUBSYSTEM INTERFACES



While providing an accurate, real-time, integrated ASW tactical picture, TDSS will permit data received over digital interfaces to be managed by an operator. Also, a reconstruction-analysis capability will allow the operator to input, record and replay data during training exercises.

Initial TDSS software will emphasize the contact management and effective display of ASW tactical warfare data. TDSS will be located where the DRT is now located, easily accessible to the ASW Evaluator, Tactical Action Officer and other CIC watch standers.

formance prediction, ocean-bottom contours, coast lines and objects of interest, all of which can be selectively overlaid onto the geographical summary plot at the operator's discretion. ASW search and detection will be supported by a display of sonar detection zones, areas of uncertainty, sensor bearing errors and counter-detection ranges based on SQQ-89(V) performance prediction inputs.

TMA tools

The operator's real work saving resides in TDSS ASW target motion analysis (TMA) tools. TDSS software localization functions will emphasize the performance of routine tasks the TMA team now performs manually. TDSS will support TMA by manipulating track data to resolve ambiguous bearings, generating trial tracks and displaying contacts and ownship maneuvers.

Operators will be able to perform cross-fixing based upon ownship and external source bearings. TDSS will provide TMA tools to conduct Bearing Doppler, Ekelund, SPEISS (Single Leg Bearing) and hyperbolic fixes as well as time bearing, time frequency, evaluator and strip plots.

Strip plots will be particularly easy to manipulate because operators will be able to compare and select track solutions that fit the tactical situation. The operator can then choose the best solution out of the two or three that may be judged as valid.

TDSS also will provide a variety of safety features. MK 116 weapon-engagement decisions will be aided by the display of NOTACK zones, MK 50 ship safety barriers, weapon acquisition areas, weapon-entry and torpedo-intercept points. Weapon firing will still take place at the MK 116 Mod 7 OJ-452 console, but TDSS will provide a more effective means to observe weapon employment safety.

Coordinated ASW

Ships with TDSS will have the opportunity to make CIC operations more efficient because TDSS will perform the work now done manually. With TDSS ASW team members will have the time and flexibility needed to concentrate on tactical functions and skills. Also, the ASW Evaluator will be able to focus on ASW mission planning, TMA or the overall tactical picture working at either the Operations Summary Console or the DDS.

Officer and other CIC watch standers.

The TDSS Remote Station Display in Sonar Control will allow the Sonar Supervisor to observe the same tactical picture being presented in CIC on TDSS. This will greatly improve the supervisor's ability to classify contacts while allowing him to more effectively discuss the overall tactical situation with other members of the watch team.

A TDSS prototype system has been installed aboard USS *Stump* (DD 980). USS *Cushing* (DD 985) will receive TDSS upon completing overhaul, with a third and fourth prototype to be installed as soon as ship nominations are approved.

Prototype tests provide user feedback to be incorporated quickly in the engineering development of TDSS hardware and software. Software upgrades, such as additional tactical decision aids suggested by fleet users, have improved TDSS development. Prototype testing will extend through 1995. Continued fleet input is welcome and should be submitted to Ms. Greta Conde at (703) 746-3045.

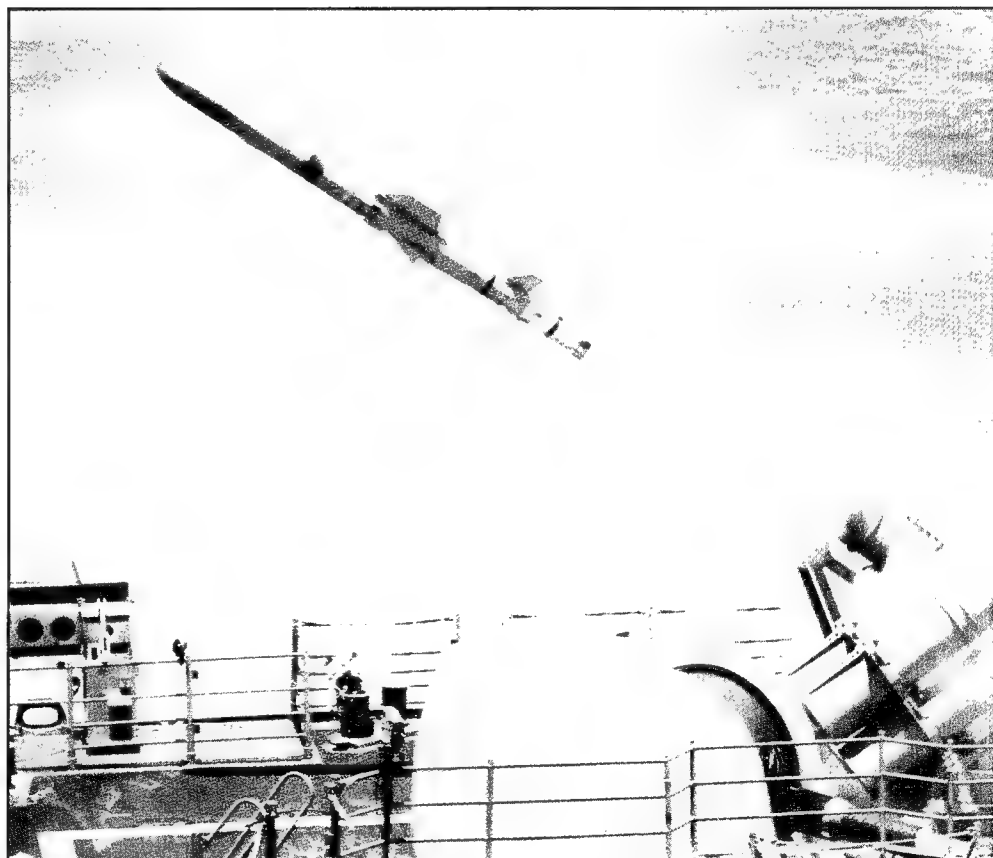
Editor's note: Ms. Conde is the project leader for the Surface Ship ASW Control Systems Office (PMO411).

Naval Surface Fire Support

“Call for fire”

by CDR Kevin Baxter

Of all the warfare areas that the surface Navy executes, one stands out for not having progressed in any real sense since World War II: fire support.



The Standoff Land Attack Missile (SLAM), has already demonstrated its capabilities in shipboard firing tests from USS Lake Champlain (CG 57). (Photo courtesy of McDonnell Douglas)

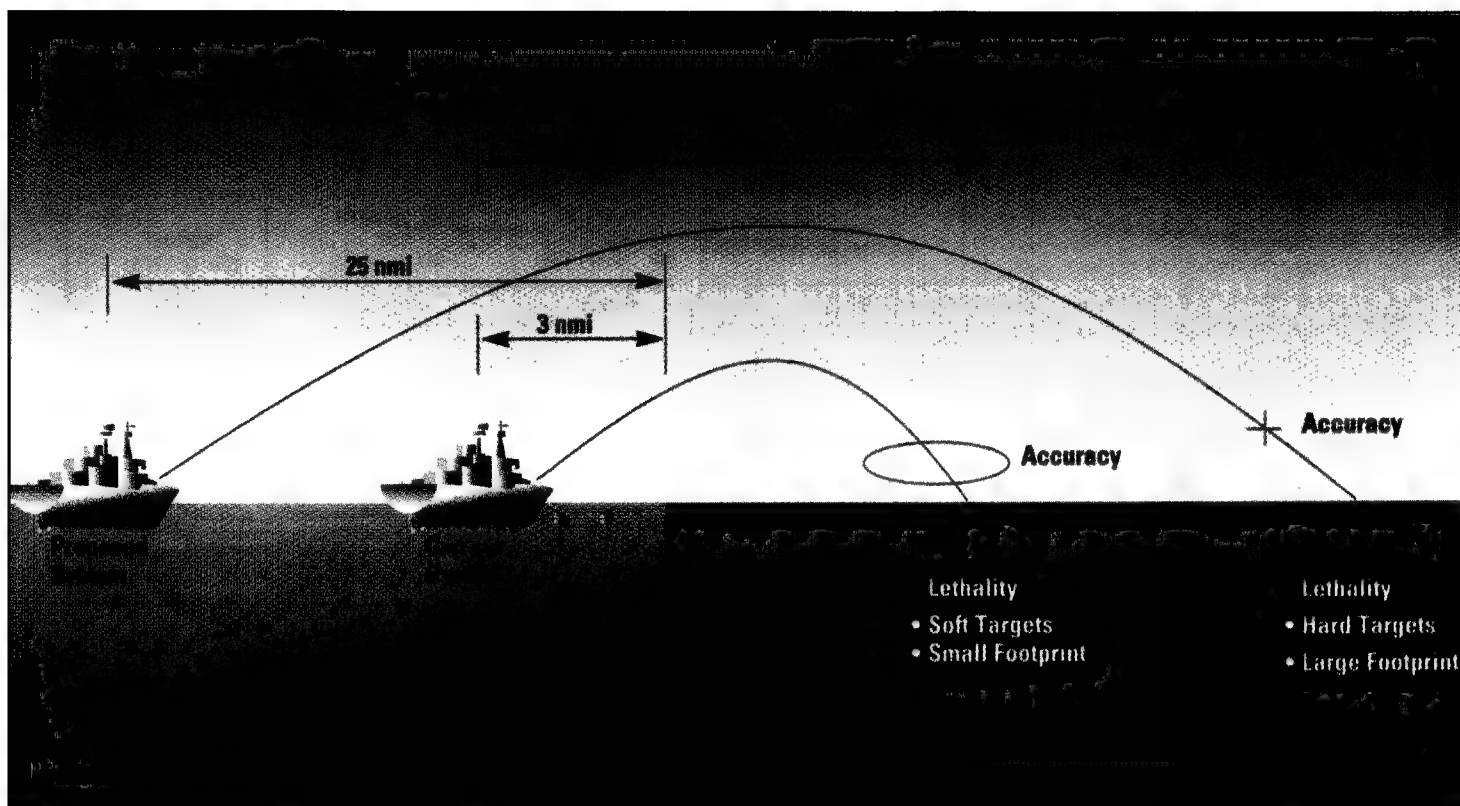
With the retirement of the battleships, we have taken a step back in range and mass of ordnance on target. That is all about to change, however. At a recent CNO Executive Board, N85 and N86 (Expe-

ditionary/ Surface Warfare Directorates) were directed to develop a naval surface fire support (NSFS) plan. The result will be a quantum improvement in the Navy's ability to support troops on the beach with guns, missiles, level-of-effort weapons and precision-guided munitions.

What is naval surface fire support? NSFS is the coordinated use of sea-based

weapon systems that provide offensive support to the maneuver commander ashore. During the early phases of the amphibious assault, NSFS substitutes for landing force organic artillery. Once organic artillery is operational ashore, NSFS will complement the fire power available from artillery and close air support.

What does this imply for *Surface Warfare*



Naval gun and ammunition developments will significantly increase range, accuracy and lethality over current capabilities. (Artist rendering courtesy of Alliant Techsystems)

Warfare? It means that the era of standing off the beach at 8,000 yards, matching navigation solutions, battling the clock, computing set and drift and wondering where that last round went is over. We have already made a start in that direction with the use of GPS (Global Positioning System) in conjunction with naval gun fire support. But NSFS is much, much more.

The Navy-Marine Corps team has embarked on an aggressive development program with a goal of enhancing range and effectiveness in fire-support capability by the year 2001. In keeping with the Navy's mission statement in *Forward... From the Sea*, the surface Navy intends to dominate the *entire* battlespace in the littoral — in front of and over the amphibious objective area, behind and all around our ships. This will be accomplished by improving command and control, coordinating with other services and taking advantage of advanced technology to shoot *smarter*.

"The Navy-Marine Corps team has embarked on an aggressive development program with a goal of enhancing range and effectiveness in fire-support capability by the year 2001."

What's ahead

Improvements planned for the fleet include near-, mid- and long-term gun programs, assessing various missile systems and developing precision-guided

munitions as force multipliers for level-of-effort weapons. Range and accuracy improvements to the MK 45 5-inch gun and propellants are expected in the near term. Other developments expected in the near future include a 5-inch/60 that will shoot guided rounds farther than (13 nm) and with greater accuracy and less dispersion than currently available.

While improving the gun, the Navy-Marine Corps team is exploring methods of addressing targets beyond reasonable gun range or otherwise requiring the use of a missile. It is not clear what kind of missile is needed, but to help in the decision process, the Navy will be conducting shipboard firing tests of the Army Tactical Missile System (ATACMS), the Standoff Land Attack Missile (SLAM) and a variant of the Standard missile. Once the advantages and capabilities of these systems are demonstrated, the Navy can proceed to a decision on which missile will best fit the needs of the fire support mission.

The *real* revolution in this process will come from the increased effectiveness of NSFS weapons, resulting primarily from the use of precision-guided munitions. While there is always a place for level-of-effort weapons (cheap dumb bombs that blow up lots of real estate to kill the target), the nature of the modern battlefield demands that ordnance hits a specific target quickly and accurately. The same technology that makes Tomahawk the "weapon of choice" for long-range precision strike can be employed in an NSFS missile or even projectile. So, when the Landing Force Commander issues an order to kill a target at a *precise* position, surface forces will be able to do it with one or two bullets rather than 100 (literally). It also means that much of what is now done by voice can be automated, further minimizing the chance of mistakes and shortening the timeline from "call for fire" to "ordnance on target."

How do we get there?

A lot of research, analysis and hard work will be required for the Navy-Marine Corps team to eventually reach its NSFS goals. In an era of shrinking budgets and fierce competition for every research and procurement dollar, the Navy must find the single most effective combination of equipment, training, doctrine and tactics, from both an economically and operational perspective. This will mean leveraging off successful systems and in-

tegrating advanced technologies to construct a state-of-the-art NSFS program. There is much to do: command and control, target location, selecting optimum systems, revising fire-support doctrine to reflect new capabilities and training the fleet on how to use them. It's a tall order but, as with the deep-strike mission, the surface Navy is out front in

implementing *Forward...From the Sea* in support of the land battle.

Editor's note: CDR Baxter is assigned to the Surface Strike office in OPNAV (N86). His last tour was as executive officer on USS John Young (DD 973). He also recently authored a series of articles on Tomahawk in SWM.

Surface Warfare

Meeting Range Requirement



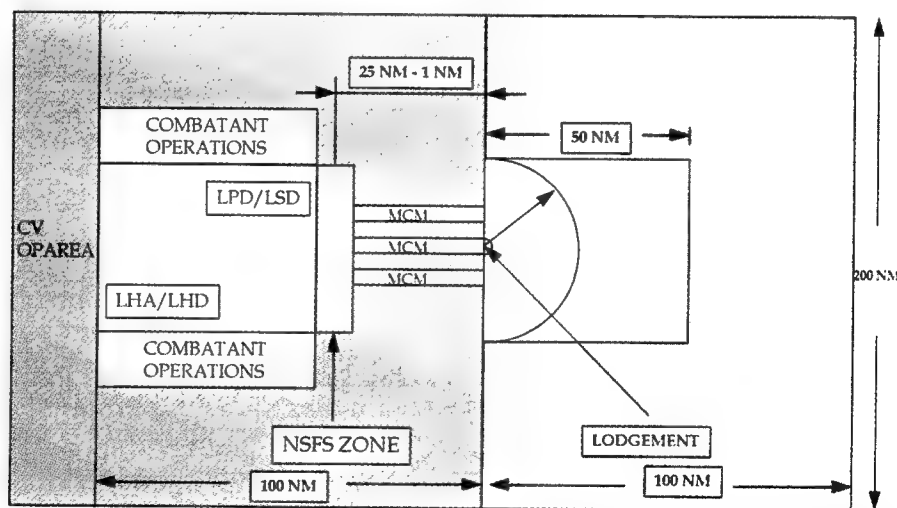
- ◆ With RAP alone, we cannot achieve minimum required range
- ◆ Modification to the MK45 Gun and more energetic propellant required

CONFIGURATION	MUZZLE ENERGY (for 110 lb PGM)	RANGE WITH RAP PROJECTILES	RDT&E (ESTIMATES)
Current MK 45	9.5Mj	~30NM	0
MK 45 with + 6" recoil length/+ 6 caliber barrel length/imp. GFCS	15Mj	~45NM	\$60M
MK 45 with •Interior Ballistic Improvement •Gun Structural Improvement	20Mj	~50NM	\$70M
MK 45 ETC Potential	25Mj	~70NM	?

Naval Surface Fire Support

Naval surface fire support must meet amphibious objective area requirements.

CATF Area of Interest



Naval Surface Fire Support

MK45 gun improvements show a dramatic increase in range.

Expeditionary Warfare



The second annual Expeditionary Warfare Conference (EWC-2) was held in November and hosted by Commander Third Fleet, VADM Conrad C. Lautenbacher Jr. at Naval Amphibious Base, Coronado, Calif.

The conference was intended to explore and develop concepts, procedures and future direction of *Expeditionary Warfare*, which focuses on operations conducted in the world's littoral regions, but also encompasses many traditional warfare areas. Directly tied to the Naval strategy *Forward...From the Sea*, the formation of this evolving warfare area is a natural outgrowth of the changing world security situation since the end of the Cold War.

EWC-2 provided a forum for the exchange of ideas and information among key Navy, Marine and industrial leaders. This year's conference was attended by more than 550 people with a strong support from Fleet and Fleet Marine Force (FMF) commands worldwide as well as OPNAV and HQMC leaders in Expeditionary Warfare. Select members of industry from the National Security Industrial Association (NSIA) were actively involved in all phases of the conference. Sponsors of EWC-2 were Director, Expeditionary Warfare Division (OPNAV/N85), MGEN Mike Myatt, and Director Operations Division (HQMC-PO), BGEN Joseph P. Anderson.

The format for EWC-2 was morning plenary sessions with presentations by various flag and general officers, who provided briefs on need-to-know information, program updates and the future direction of the Navy-Marine Corps team. Afternoons were reserved for meetings of the 11 working groups which covered a wide range of expeditionary warfare areas, such as power projection, command and control, mine warfare, naval surface fire support and amphibious lift. Each working group reviewed topics submitted by the Fleets and FMFs while debating other related issues among themselves. A flag and general officer panel received briefings on the highest priority items from the working group deliberations and provided specific direction and actions to be carried out after the conference.

Commandant of the Marine Corps, GEN Carl E. Mundy, gave the keynote address of EWC-2 by providing concise insight to the direction and importance of the Navy-Marine Corps team and its unique role in providing Naval expeditionary forces as an instrument of national policy. RADM Thomas Lynch and BGEN Michael Ryan presented the updated Naval strategy, *Forward...From the Sea*.

Other presentations/speakers included:

CVBG/ARG/MEU Joint Integrated Training,
VADM Lautenbacher, COMTHIRDFLT
Strategic Mobility, VADM LaPlante, JCS J5
Chaos in the Littorals, MGEN Myatt, OPNAV 85
Expeditionary Logistics, MGEN Stewart,
COMCARLOG Base
Exercise Agile Provider Overview, RADM Picotte,
COMPHIBGRU Two
Overview of Naval Doctrine Center, RADM Lewis,
Naval Doctrine Center
Army Prepositioned Afloat Material, LTCOL Martz,
USA (DA-ODCSOPS)
MCM Community Issues and Requirements,
RADM Pearson, COMINWARCOM
Expeditionary Command and Control, MGEN Van
Riper, HQMC C4I
Navy Special Warfare Support to Expeditionary
Warfare, RADM Smith, SPECWARCOM
NSIA Overview, VADM Mustin, (Ret), NSIA

The EWC represents a unique opportunity to bring all disciplines involved in Expeditionary Warfare together to discuss the important issues and chart the course for the future. EWC-2 proved to be an exceptionally informative and meaningful conference. With continued interest from the Fleet operators and headquarters' staffs, the Expeditionary Warfare Conference will continue to play a vital role in shaping the future of this rapidly evolving warfare area.

Wanted: Small Boats

Small boats offer unique opportunity for surface warriors

by LT Tim Huff

If you're physically tough, highly motivated and capable of handling stressful situations, take a tour in a Special Boat Unit (SBU). Surface warfare officers are assigned to SBUs as division officers, department heads and detachment officers in charge (OICs) while enlisted Sailors pursue SBUs with a goal of attaining the title of "Boat Captain."

When the detailer first suggested that I take orders to a SBU, I asked the obvious question: "A what?" SBUs conduct and support Naval Special Warfare (NSW) operations, either working with Special Operations Forces (i.e. SEALs) or independently. My experience at a SBU has been an interesting and rewarding experience.

After arriving at SBU-20, I learned the primary vehicles utilized to support the command's mission were Rigid Inflatable Boats (RIBs). Others include coastal patrol, *Cyclone*-class ships and the new Mk 5 Special Operations Craft. Most surface warfare officers have at least a nodding acquaintance with RIBs as many surface combatants have, or soon will have, a 24-foot RIB. I was a little curious at first about how a craft used as a motor whale boat supported NSW. Then, I had the pleasure of attending a training mission to qualify one of the RIB petty officers in charge, a.k.a. boat captains. (A boat captain is a petty officer second class or higher who is in charge of the safety, security and proper operation of "his" designated boat). This training evolution introduced me to most of the RIB's capabilities in one fast-paced and exhausting evening.

The hull and sponson design of a NSW RIB may be the same as the rest of the fleet's boats, but that's where the similarities end. NSW RIBs are powered by one or two engines, depending on RIB type, which are enhanced to provide 200-400 horsepower apiece. Coupled to a high

speed prop or water jet drive, they are capable of attaining speeds between 25-40 knots. All of the RIBs have a radar arch that can support HF, VHF, UHF and SATCOM antennas. In addition to the Radome and navigational lights, many of the RIBs have IFF (identification friend or foe) and IR (infrared) identification systems to aid in their mission.

Each RIB has a crew of three combatant craft crewman (SNEC 9533) and is equipped to carry between four to eight fully equipped SEALs. All RIBs have GPS and LORAN navigation system as well and magnetic compasses and are designed to operate in heavy seas, up to sea state 5.

SBU personnel are highly dedicated, professional and resourceful Sailors who must be able to maintain at least an "excellent" in the Navy physical readiness test and complete a 500-yard swim in order to attain a 9533 qualification. These demanding requirements are necessary to prepare SBU personnel to survive the adverse conditions and hazards of RIB operations. Because a RIB ride can be a physically punishing and exhausting experience, those without the physical strength and stamina to properly perform the mission usually get hurt.

It isn't all physical though. SBU Sailors also must complete the combatant craft crewman course of instruction and 9533 PQS as well as convince their command through a battery of written exams, oral boards and practical exercises that they have what it takes. If successful, SBU petty officers are encouraged to go through another barrage of qualifications

and intense scrutiny to become boat captains. Officers and chief petty officers are required to fulfill many of the same qualification standards, plus a little extra, to be part of a RIB detachment and to qualify as a "Patrol Officer."

MARK V:

During the Persian Gulf War, the U.S. military had the opportunity to assess weapon systems and analyze areas for improvement. It became obvious that there was a need for a new boat for special, clandestine missions requiring speed and versatility.

That boat has arrived: *The Mark V Special Operations Boat*.

The versatile, high-performance Mark V combatant craft will be used by U.S. Navy SEALs for missions such as medium-range insertion/extraction, limited coastal patrol and interdiction. The Mark V special operations craft is capable of being transported by C-5 aircraft, meaning that two boats can be deployed anywhere in the world within a period of 16 hours.

The 82-foot Mark V is propelled by two 2,285 horsepower HP MTU 12V396 TE94 engines with two KaMeWa K50S waterjets. It has a fuel capacity of 2,600 gallons. The craft cruises at a speed between 25 and 45 knots, with a top speed of more than 50 knots. Its range is more than 500 nautical miles, with a variable payload of more than 6,400 pounds.

Patrol officer qualification is similar to a combined achievement of SWO/ESWS, Engineering Officer of the Watch (EOOW) and Tactical Action Officer (TAO) qualifications on a surface combatant. A patrol officer must have a thorough working knowledge of the power plant and electrical systems, know how to spot problems before a casualty occurs and perform emergency casualty procedures — many of which can occur in heavy seas or in a combat situation.

The patrol officer also is charged with knowing the tactics and proper employment of his crew, weapons and craft. He often must make these decisions in stressful situations and without communications

with higher authority. SBU commanding officer must trust his patrol officer or chief to deploy with two high-speed, sophisticated and heavily armed boats to perform missions that can have a significant impact on the way the Navy performs its mission. This amount of confidence is not awarded without careful thought.

One of the operational philosophies beaten into every training evolution is proper noise and light discipline. Until recently, most conventional surface ships did not rely heavily on "stealth" to be successful. Special Operations Forces require it to stay alive. In the same manner, a RIB detachment's first and best line of defense is stealth. All operational emphasis is

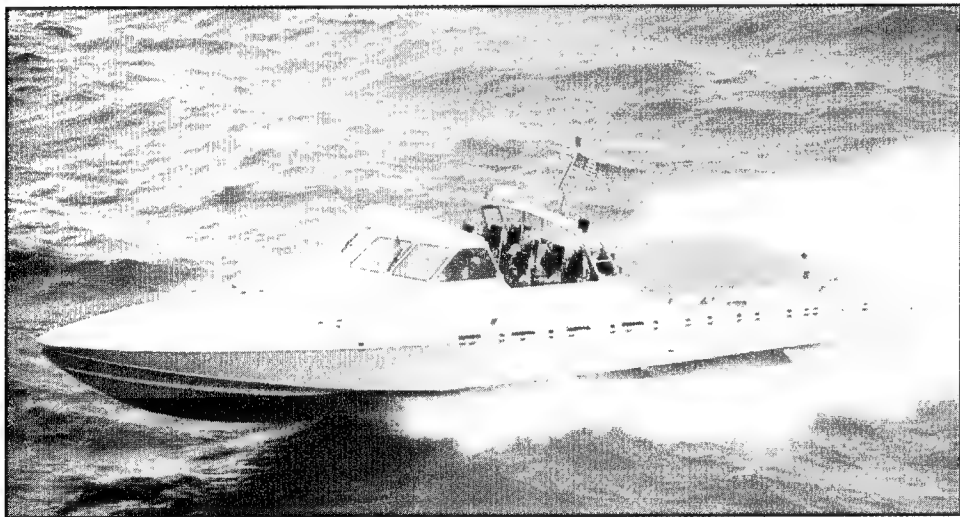
placed on arriving unseen/unheard and leaving in the same manner. Made of glass-reinforced plastic (fiberglass) and neoprene, the RIB does not provide much protection. At least with larger ships, there is aluminum or steel between you and the enemy's bullets.

Ships use navigational lights more often than not, but RIBs rarely employ them unless they are trying to "hide in plain sight." This is one aspect of NSW that takes some getting used to. Traveling at high speed at night without any navigational lights or radar and using hand signals to communicate between boats is much different from my operational experience on a surface combatant. Night vision goggles help a great deal, but they do not provide the same complete picture as a good navigation radar and lights.

If stealth is not completely successful, there is the weapons load-out to consider. The only time aboard ship we routinely use small arms is to requalify with the weapons or to perform a security alert drill. Unlike large combatants that rely on large guns and missiles to carry out its missions, a RIB detachment must rely on small arms and speed to break contact. RIBs are not gunboats, but the amount of small-arms weapons training conducted by a *single* RIB detachment is almost equivalent to the amount of training conducted by a larger ship's force of more than 300 people. The small arms used by RIB personnel include .45-caliber pistols, M-14 rifles, 12-gauge shotguns and M-60E machine guns.

A tour in a NSW SBU can be a challenging and professionally rewarding assignment for any surface warrior, officer or enlisted. As the Navy-Marine Corps team continues to focus on littoral operations, Naval Special Forces will remain at the center of our ability to conduct forcible entry. I recommend that anyone interested in the opportunities afforded by NSW, including the desire to man *Cyclone*-class ships, complete a tour in a Special Boat Unit.

SEALS fast patrol boat



Special Operations Patrol Craft (Photo courtesy of Trinity Marine Group)

The navigation system includes radar, Global Positioning System, chart plotter, fathometer and flux gate compass. Its communication system includes: VHF-BTB, VHF-FM, UHF/VHF-FM, UHF AM/FM, LOS/SATCOM, VHF-High Band, HF, UHF-handheld, data and IFF.

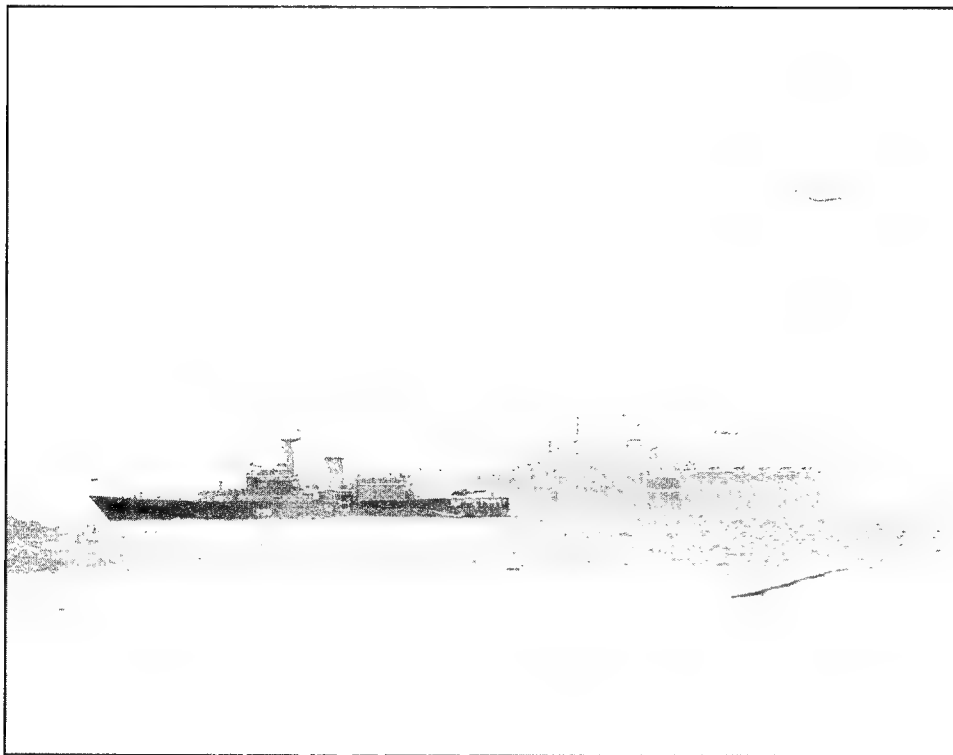
It has five mounting positions for 7.6mm, 12.7mm and 40mm weapons. Improvements include 7.62mm gatling guns, twin 12.7mm and 25mm guns, and STINGER anti-aircraft missiles.

The craft can accommodate a crew of five, 16 passengers and four combat rubber raiding craft.

In an article appearing recently in the *Tampa Tribune*, CAPT Jon Wright of the U.S. Special Operations Command said, "It is the most reliable, highest performance craft of its kind in the world today."

The boat is built by Halter Marine, Inc. of Gulfport, Miss.

Guard our Gators!



USS Wasp (LHD 1) and Indian patrol (frigate) ship Sukanya operated together off the coast of Mogadishu, Somalia.

by OSCS (SW/AW) Thane A. Lindholm

As amphibious ready groups (ARGs) are increasingly tasked to project a viable deterrent force in the wake of dwindling overseas assets, the Pacific theater of operations seriously needs to consider allocating an *Oliver H. Perry*-class frigate (FFG) in a full-time support or "shotgun" role to the (three-ship) ARG. An FFG would not only give the ARG added offensive punch, but also greatly enhance its ability to defend itself by providing anti-air, anti-surface and anti-submarine warfare capabilities. ARGs have little or no warfighting capability in these areas, making them vulnerable to enemy attack.

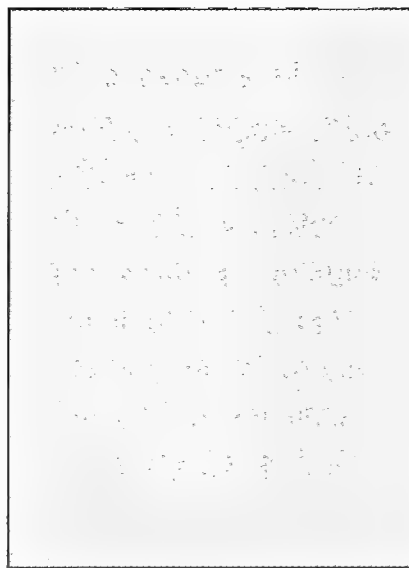
Due to the extreme distances, additional commitments in the Pacific and the ARG's slow speed of advance, a carrier battle group is not always readily available to directly support an ARG. Historically, ARGs have performed many missions — from humanitarian relief to non-combatant evacuations — without the support of a carrier or other surface

combatant. From Operation Restore Hope in Somalia to disaster relief in Bangladesh and the Republic of the Philippines, "Gators" have done it all. Yet, if one person from any of these nations had decided to pack a Zodiac or a small aircraft with explosives, the ARG could have been a target with little self-defense capability.

In regard to anti-air warfare, the ARG has no long-range defense system and is heavily dependent upon intelligence reports needed to counter an incoming threat with AV-8B Harrier or AH-1W Sea Cobra aircraft. Most ARG ships have, or will have, Rolling Airframe Missile (RAM) and Close-In Weapons Systems (CIWS), which are fine as a last resort. But as primary defensive weapons, these weapon systems lack the range needed to effectively defend an ARG under attack.

With LHA/LHD flight-deck operations limited to a 12-hour flight cycle (due to manning), they are dependent upon a number of conditions to set flight quarters. In response to an air threat, they must wait to get surveillance data, conduct a FOD walkdown, break out the appropriate stores from ready service lockers and load them aboard an aircraft before take-off. The support of a lone FFG would prevent this delay. The frigate's air-search radar, coupled with its datalink capability, allow for real-time display of information not available within the ARG. An FFG also would reduce potential Blue on Blue/White engagements by having a dedicated platform to conduct Mode IV IFF (identification friend or foe) checks, giving the ARG an around-the-clock offensive and defensive AAW capability.

In addition, an FFG would improve the ARG's ability to counter an air threat. An FFG's SM-



I (medium range) surface-to-air missile system is a fast and effective weapon that can be employed within minutes and can engage contacts well before point-defense systems such as RAM and CIWS.

As for an anti-surface capability, the ARG has tremendous potential. With Harriers armed with AGM-65 Maverick missiles and laser-guided bombs, Sea Cobras equipped with BGM-71 (TOW) missiles and UH-1N Hueys equipped with 2.75 Folding Fin Aircraft Rockets, the ARG's strike capability can be devastating to a lightly armed force. However, this capability would be significantly increased with the addition of a frigate and its LAMPS MK III helicopter. The Hawk Link aboard an SH-60B provides the PHIBRON commander a real-time, over-the-horizon display while new weapon systems under the armed helicopter program (see page 20) give LAMPS MK III a distinct advantage against fast patrol boats and other littoral threats.

Another problem the ARG has involves its ineffective CWC (composite warfare command) structure,

which lacks the necessary tools needed to be tactically proficient. For example, although the PHIBRON staff appoints an Anti-Submarine Warfare Commander, there are no organic assets available to counter or prosecute a submarine threat. Since the ARG normally operates near land, a frigate and its LAMPS detachment would serve an invaluable role by identifying submarine threats and conducting shallow-water ASW. Using Hawk Link, the PHIBRON commander could then move the ARG away from the threat sector and enhance the safety of the landing force.

The benefits of adding a frigate to the ARG are unlimited. An FFGs unique warfare and speed advantages would allow it to sanitize an area of operation well in advance of the ARG's arrival. In addition, its LAMPS MK III could be used to insert special forces and reconnaissance elements (i.e. combat raider craft) ahead of the ARG, establishing vital intelligence assets ashore before the ARG arrives.

During these times of dwindling assets, we must carefully consider reducing the size of a carrier battle group. But with Naval forces focused on littoral/expeditionary warfare, I firmly believe permanently assigning just one highly versatile FFG to the ARG would increase its offensive capabilities while dramatically improving its chances of survival.

Editor's note: OSCS(SW/AW) Lindholm is assigned to TACRON 12 as the senior Air Interceptor Control Supervisor. He has completed 13 deployments to the western Pacific/Indian Ocean, primarily aboard cruisers and destroyers. Four of his deployments have been in direct support of amphibious ready groups.

STRIPE

U.S. Navy ships assist burning Achille Lauro

USS *Gettysburg* (CG 64), homeported in Mayport, Fla. and USS *Halyburton* (FFG 40), out of Charleston, S.C., completed the final phase of rescuing passengers from the burning Italian cruise liner, Achille Lauro, Dec. 4 when the ships docked in Djibouti and transferred survivors ashore. *Gettysburg*, commanded by CAPT Peter R. Smith, disembarked 164 survivors while *Halyburton*, under the command of CDR Robert D. Riley, Jr. disembarked 47.

Navy commissions USS *Harpers Ferry*

The Navy's newest ship, *Harpers Ferry* (LSD 49), was commissioned recently at ceremonies in New Orleans.

Harpers Ferry, which entered the first stages of production in October 1990, is the first of four new cargo variants to the *Whidbey Island*-class (LSD 41) of dock landing ships. Her mission is to project power ashore by transporting and launching amphibious craft and vehicles. *Harpers Ferry* also can render limited docking and repair service to small ships and craft, as well as act as the primary control ship in an amphibious operation.

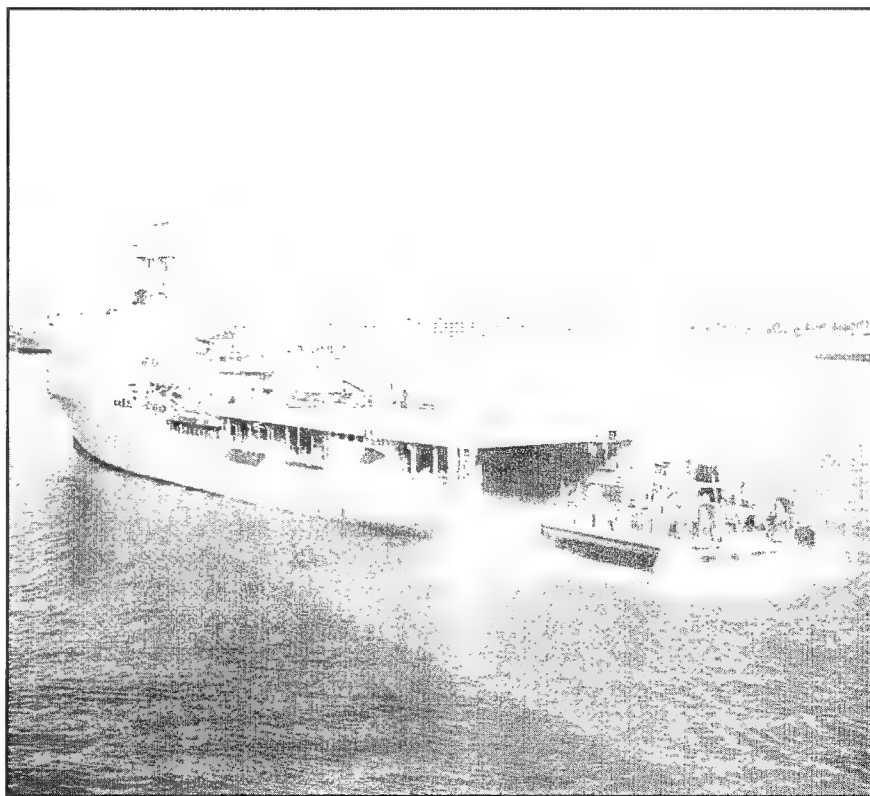
Harpers Ferry is named in honor of the historic town in West Virginia where John Brown's bloody campaign to end slavery reached its climax. Brown, who planned to free the slaves through force, captured the United States Arsenal at Harpers Ferry. Although the plan failed and Brown was eventually captured and hanged, his efforts at Harpers Ferry increased tension between the North and South in the period shortly before the Civil War. During the Civil War, Harpers Ferry became a strategic location and was the site of numerous battles.

The transfer of survivors began at 8 a.m., local time and ended nine-and-a-half hours later with 820 passengers being transported and 140 remaining aboard the tanker Hawaiian King. All of the ships, with the exception of *Gettysburg*, then set sail for Kenya, Djibouti, and the Seychelles Islands where the survivors were met by representatives of their countries. *Gettysburg* remained on station with the still burning Achille Lauro until the salvage tug Salano arrived late that night. Later, *Gettysburg* set sail to join *Halyburton* en route to Djibouti.

Briscoe crew members' heroic actions honored

Fifteen crew members of USS *Briscoe* (DD 977), CDR Andrew J. Pitts commanding, received Navy and Marine Corps Medals for heroic actions taken while aiding the Egyptian passenger ferry Al-Qamar Al-Saudi Al-Misri in May.

After receiving a distress call, the Norfolk-based *Briscoe* steamed to the aid of the burning vessel. One standout among the medal recipients is SM1(SW) Tidera M. Griffin, a rescue



USS *Harpers Ferry* (LSD 49)

Harpers Ferry can carry 853 Sailors and Marines and their equipment. The ship is more than 609 feet long, 177 feet high and has a displacement of 16,740 tons when fully loaded. It is

powered by four, 16-cylinder Colt-Pielstick diesel engines that generate 33,000 horsepower. CDR Charles P. Salsman, a native of Newport, R.I., is the ship's commanding officer.

Surface Warfare

boat signalman. His rescue efforts included catching a baby who had been dropped 30 feet from the vessel by her father.

Briscoe's boat crews made repeated approaches to within 10 feet of the burning ship that was in imminent danger of capsizing, rescuing 476 passengers from the ferry.

USS *Monsoon* transits Panama Canal with enlisted watch team

USS *Monsoon* (PC 4), returning to San Diego from a deployment to the Caribbean in support of joint military operations in Haiti, transited the Panama Canal with enlisted personnel filling all watch positions.

"I am very proud of having served as OOD during this nighttime transit," said *Monsoon's* Command Chief, DCC(SW) Robert Nugent. "It shows that given the chance the enlisted man will prove his extraordinary capabilities."

The patrol coastal class is manned by a crew of four officers and 24 enlisted personnel, affording tremendous opportunities for enlisted crew members to achieve top watch qualifications as officer of the deck underway, engineering officer of the watch and command duty officer.

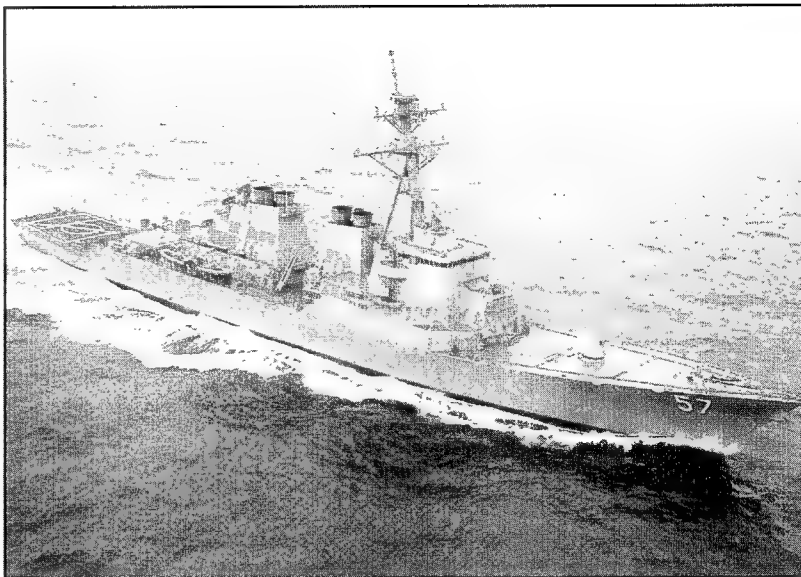
Monsoon, under the command of LCDR Adam Levitt, is one of four PCs assigned to Special Boat Squadron One in San Diego.

Destroyer Squadron 50 reestablished overseas in Arabian Gulf

Destroyer Squadron 50 became the first destroyer squadron to be permanently forward-deployed in the Arabian Gulf region when it was reestablished Nov. 30 during ceremonies on board the aircraft carrier USS *Dwight D. Eisenhower* (CVN 69). Navy CAPT David M. Stone took command of DESRON 50, 49 years after it was disestablished in the Pacific.

In the absence of a carrier battle group, Commodore Stone and his staff

January/February 1995



USS *Mitscher* (DDG 57) underway

The guided-missile destroyer, USS *Mitscher* (DDG 57), was commissioned in Pensacola, Fla., Dec. 10. The Honorable John H. Dalton, Secretary of the Navy, delivered the ceremony's principal address. Homeported in Norfolk, Va. and commanded by CDR Roy J. Balaconis, *Mitscher* is named to honor ADM Marc Andrew Mitscher (1887-1947), famed naval aviator and World War II aircraft carrier task force commander. The ship's sponsor is Elizabeth Ferguson, niece of the ship's namesake. (Also see back cover)

will serve as Commander, Middle East Force Surface Action Group. DESRON 50 also will execute the Navy's extensive regional exercise program for surface combatants, working with friends and allies in the Gulf region.

"COMDESRON 50 is being recommissioned here in the Arabian Gulf to provide U.S. Naval forward presence to this very vital region of the world," Commodore Stone said. "We represent all three pillars of our country's national security strategy of 'engagement, partnership and prevention.'"

USS *Merrimack* QMs manually navigate across the Atlantic

Quartermasters aboard Norfolk-based USS *Merrimack* (AO 179), com-

manded by CDR Robert C. Jackson, recently brought their ship home the old-fashioned way: The ship switched off all electronic positioning systems, including the Global Positioning System.

As generations of sailors had done before, *Merrimack's* quartermasters turned skyward, relying on whatever heavenly bodies were visible and a painstakingly maintained dead-reckoning plot to find their way across the Atlantic.

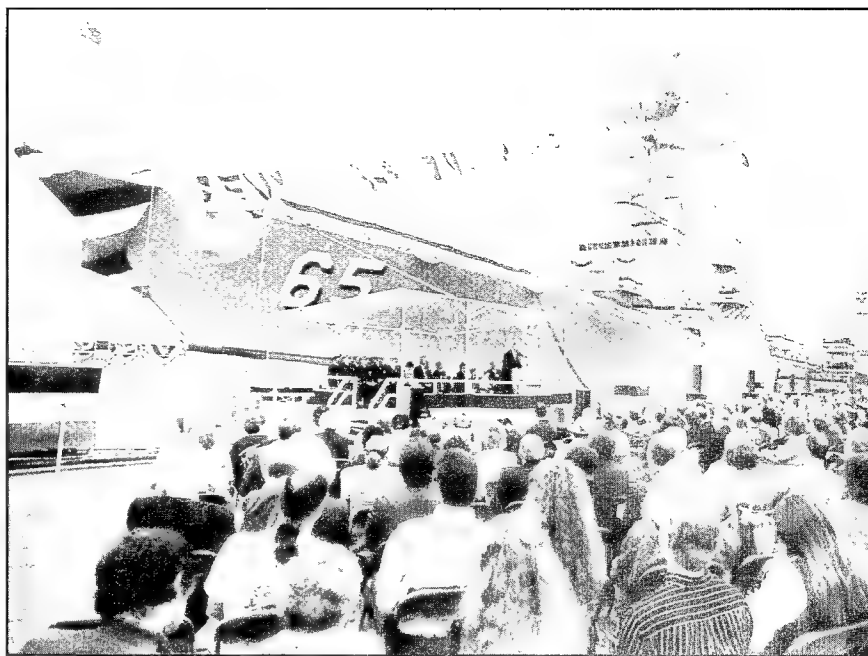
The ship successfully made a scheduled rendezvous with USS *Connolly* (DD 979) which provided the crew with an accuracy check before a radar landfall was made.

The QMs proved that while high-tech gear provides modern Sailors with a wealth of convenience, the fleet can always rely on skilled seamanship to get the job done.

Expeditionary Medal awarded for Operation Uphold Democracy

Chairman of the Joint Chiefs of Staff, GEN John M. Shalikashvili announced that the Armed Forces Expeditionary Medal (AFEM) will be awarded to personnel who served in, or directly supported, Operation Uphold Democracy. The established opening date for receiving the award is Sept. 16, 1994. No closing date is set. The AFEM may be authorized for three categories of operations: U.S. military operations, U.S. operations in direct support of the United Nations and U.S. operations of assistance for friendly foreign nations.

The criteria for the award require that U.S. Armed Forces must have participated in a military operation in significant numbers and that those forces either encountered foreign armed opposition or otherwise were placed in such a position that hostile action by foreign armed forces could have been imminent, even though it did not occur.



USS *Benfold* (DDG 65) christened

More than 700 guests were on hand Nov. 12 as the guided-missile destroyer, DDG 65, was christened "*Benfold*" at Ingalls Shipbuilding division of Litton Industries in Pascagoula, Miss. DDG 65 is named in honor of Hospitalman Third Class Edward Clyde Benfold, who was posthumously awarded the Medal of Honor for extraordinary heroism during the Korean War. *Benfold* is slated for service in the Pacific Fleet but a homeport has not been determined.

Changes of Command

SURFPAC

USS *Willamette* (AO 180), CDR Norma L. Hackney relieved CDR Conrad B. Divis in Nov.

USS *John Paul Jones* (DDG 53), CDR Peter B. Opsal relieved CAPT John M. Kelly in Dec.

USS *Leftwich* (DD 984), CDR Chris W. Kopang relieved CAPT Samuel J. Locklear, Jr. in Dec.

USS *George Philip* (FFG 12), CDR Robert A. Butt relieved CDR Harold J. Flammang, Jr. in Dec.

USS *Chandler* (DDG 996), CDR Gerard L. Becker relieved CDR Vincent J. Andrews in Dec.

SURFLANT

USS *Arleigh Burke* (DDG 51) CDR Jeffery Wepler relieved CDR Lyal B. Davidson in Oct.

USS *Butte* (AE 27), CDR David P. Smith relieved CDR David W. Wood in Nov.

EODMU Two, CDR John L. Bowles relieved CDR David R. Barclay in Nov.

USS *Santa Barbara* (AE 28), CDR Gary L. Roemmich relieved CDR James M. Graham in Nov.

USS *Inchon* (LPH 12), CAPT David M. Crocker relieved CAPT William D. Young in Nov.

COMDESRON 26, CAPT John G. Morgan relieved CAPT W. Scott Slocum in Nov.

USS *Hawes* (FFG 53), CDR James A. Sanford relieved CDR Raymond P. Donahue in Jan.

USS *Platte* (AO 186), CDR R.S. Warner relieved CDR M.W. Lamboni in Jan.

USS *Pensacola* (LSD 38), CDR R.A. Bauer relieved CDR J. Henderson in Jan.

USS *Taylor* (FFG 50), CDR Gregory Cornish relieved CDR Christopher P. McNamara in Dec.

USS *Aubrey Fitch* (FFG 34), CDR R.L. Sweeney relieved CDR C.R. Knouse in Dec.

USS *DeWert* (FFG 45), CDR Richard G. Huffman relieved CDR Richard D. Uyak in Dec.

USS *Compte De Grasse* (DD 974), CDR Richard C. Hill relieved CDR William C. Moye in Dec.

USS *LaSalle* (AGF 3), CAPT Mark R. Milliken relieved CAPT Jack J. Samar in Dec.

USS *Mahan* loss commemorated at sea

The 50th anniversary of the sinking of USS *Mahan*, a World War II destroyer, was commemorated Dec. 7, in a wreath laying memorial service off the coast of Point Loma, San Diego aboard USS *Lake Champlain* (CG 57).

Before being sunk off Leyte, Republic of Philippines, *Mahan* engaged in many battles in the Pacific, sinking two Japanese naval ships and a score of Japanese aircraft.

On the fatal date, *Mahan* was attacked by nine kamikazes, of which four were shot down by *Mahan's* gunners. Three of the kamikazes managed to crash into *Mahan* causing extensive damage. Fires from exploding magazines forced the crew to abandon ship. Her remains were later sunk by another U.S. naval ship.

Survivors of *Mahan's* last battle included her Captain, Earnest G. Campbell and approximately 135 family and friends of former crew members.

SWO wins joint prize

The winners of the Naval Institute's Colin L. Powell Joint Warfighting Essay Contest were presented awards during a Pentagon ceremony featuring the present and former Chairmen of the Joint Chiefs of Staff.

LCOL. Jay L. Lorenzen, USAF, received a \$2,500 cash prize. First honorable mention, CAPT Dean T. Katsiyannis, USA, received \$2,000. Second honorable mention was CAPT Powell A. Fraser Jr., Commanding Officer, USS *Cape St. George* (CG-71). Deployed at the time of the award, he was represented by his wife Sheila and son Powell A. Fraser III, who accepted the \$1,000 prize on behalf of his father.

Qualifications for Command at Sea

LCDR James J. Bird, USS *Austin* (LPD 4)

CDR Stephen J. Camacho, USS *Yorktown* (CG 48)

LCDR Kevin P. Denham, USS *Kauffman* (FFG 59)

CDR George G. Galyo, USS *Ticonderoga* (CG 47)

LCDR John P. Johnston, USS *Edenton* (ATS 1)

LCDR Thomas E. Johnston, USS *Shreveport* (LPD 12)

LCDR Karen M. Krause, USS *Yellowstone* (AD 41)

LCDR Bruce H. McCombie, USS *Arthur W. Radford* (DD 968)

LCDR Patrick W. O'Kane, USS *Monterey* (CG 61)

LCDR Robert P. Sabo, USS *John L. Hall* (FFG 32)

LCDR Robert P. Strait, USS *Monongahela* (AO 178)

LCDR Albert A. Thomas, USS *Harlan County* (LST 1196)

LCDR James A. Zaganis, USS *Detroit* (AOE 4)

Command Master Chief moves

Jan-Feb 1995

Name	Rate	From	To
Van Dusen, Carl	MMCM(SW/SS)	NPTU Idaho Falls	USS <i>Normandy</i> (CG 60)
Staller, Joseph	YNM(AW)	VF-124	USS <i>Chancellorsville</i> (CG 62)
Smith, Tom	GSCM(SW)	USS <i>Leyte Gulf</i> (CG 55)	COMDESRON 8
Palmer, Robert	YNM(SW)	VRC-50	USS <i>Germantown</i> (LSD 42)
Minor, Timothy	OSCM(SW)	NAVSTA Rota, Spain	USS <i>Kearsarge</i> (LHD 3)
Hudson, Thomas	GMCM(SW)	NAVWEPSTA Yorktown	USS <i>Austin</i> (LPD 4)
Caldwell, John	ISCM(AW/SW)	COMNAVAIRLANT	USS <i>Arleigh Burke</i> (DDG 51)
Bergosh, Bob	EWCM(SW)	CINCPACFLT	USS <i>Lake Erie</i> (CG 70)

Fleet-support community established

Message from the Deputy Chief of Naval Personnel:

"The Secretary of the Navy has recently approved the creation of a new restricted line community designator, 1700 Special Duty Officer (Fleet-Support). This community will initially be composed of general unrestricted line officers who for the past 20 years have developed into a critically important shore and fleet-support community. Now that women will be serving routinely in all unrestricted line positions on combatant surface ships and combatant aircraft, it makes eminent good sense to transition the general unrestricted line officers into this new 1700 community.

I believe the 1700 restricted line community will grow to be an extremely important shore command and fleet-support community that will meet the many challenges that our Navy faces in the future. I encourage all unrestricted line officers who may be considering a designator change in the future to strongly consider a lateral transfers into this community. That being said, I must also point out that I anticipate the standards set for a lateral transfer to be exceedingly tough. Only those who have suc-

cessfully served as department heads (in some cases, as division officers) and who have strong warfare qualifications will be seriously considered for a lateral transfer.

The 1700 community will focus on four core areas of expertise: manpower and personnel, space and electronic warfare, shore-base support and technical support. My sense is that shore-base support and space and electronic warfare will be the principal areas of concern of the 1700 community in the future.

The first lateral redesignation board to consider officers for Fleet-Support will be held in April 1995. If you are interested in challenging assignments in a community that is bound to grow in importance to our Navy in the future, and if you are an officer with an outstanding record in your warfare specialty, then I encourage your consideration for a transfer to this community. You will have great growth potential, and the Navy needs our very best in this community."

--RADM H.C. McKinney

Surface Warfare Magazine 1994 index

Leadership and policy

Mr. Pang interview: Putting people first	Mar/Apr 94:2
TQL: Making a difference	Mar/Apr 94:6
Surface Warfare Director change of command	Mar/Apr 94:35
Women at sea: Same challenges/opportunities	May/Jun 94:2
ADM Boorda is new CNO	May/Jun 94:8
Ms. Slatkin interview: To keep our edge	May/Jun 94:12
RADM Paddock interview (Surface Reserve)	Jul/Aug 94:3
Surface Reserve Force assessment (RADM Hall)	Jul/Aug 94:6
Accessing the Naval Reserve	Jul/Aug 94:9
MGEN Jenkins interview (Expeditionary warfare)	Jul/Aug 94:26
Naval Reserve roles and missions study	Sep/Oct 94:33
Future of the Surface Reserve	Sep/Oct 94:34
Environment of readiness (Mr. Sanders)	Sep/Oct 94:36
<i>Forward...From the Sea</i>	Nov/Dec 94:2
ADM Boorda interview: What are we all about?	Nov/Dec 94:8
Naval roles and missions (VADM Reason)	Nov/Dec 94:15
New PRT instruction	Nov/Dec 94:30

Surface Forum

Mine warfare: What are we doing wrong?	Jan/Feb 94:24
Think tactics	Mar/Apr 94:8
Surface Navy's eternal truths	Mar/Apr 94:10
Women at Sea: It's about time	May/Jun 94:6
Time to rethink uniform policy	Sep/Oct 94:6
SWO's and aviator's wall of misunderstanding	Nov/Dec 94:34

Operations/Training

Operation Support Democracy	Mar/Apr 94:24
Great Lakes: Center of training excellence	Jul/Aug 94:10
SWOS Division Officer Course restructured	Jul/Aug 94:14
Senior Enlisted Academy in transition	Jul/Aug 94:16
MSC: Logistical support for dual contingencies	Nov/Dec 94:36

Material readiness

Surface ship maintenance	Jan/Feb 94:3
Reliability-centered maintenance (RCM)	Jan/Feb 94:7
Tag Link: Safety-tag innovation	Jan/Feb 94:12
Simplifying technical documentation	Jan/Feb 94:14
Condition-based maintenance (CBM)	Mar/Apr 94:28
Battle Group IMA	Mar/Apr 94:32
Assessment of Equipment Condition (AEC)	May/Jun 94:28
Automated PMS	May/Jun 94:31
Integrated Condition Assessment System (ICAS)	Sep/Oct 94:28

Combat readiness

Importance of "the brief"	Mar/Apr 94:14
Tactical decision making under stress	May/Jun 94:16
Tactics and quantitative thinking	Sep/Oct 94:40
Tactical maneuvering in the '90s	Sep/Oct 94:42

Combat systems development

CIWS improvements (SSDS Part II)	Jan/Feb 94:34
Over-the-horizon targeting: Mountain Top	Mar/Apr 94:12
SES-200 — systems test platform	Mar/Apr 94:18
RAIDS: A tool for the tactician (SSDS Part III)	Mar/Apr 94:36
Tomahawk: Better than ever	May/Jun 94:20
JTIDS deploys	Jul/Aug 94:17
Tomahawk: What we don't see	Jul/Aug 94:34
SLQ-32 improvements (SSDS Part IV)	Jul/Aug 94:38
Penguin missile offers new strike capability	Sep/Oct 94:9
TBMD: A revolution in surface warfare	Sep/Oct 94:12
SPY-1 radar's next evolution	Sep/Oct 94:14
RAM System (SSDS Part V)	Sep/Oct 94:15
Navy TBMD: LEAP into the future	Sep/Oct 94:18
Cooperative Engagement Capability	Sep/Oct 94:22
<i>Decatur</i> — systems test platform (SSDS Part VI)	Nov/Dec 94:26

Ship development

<i>Osprey</i> counters modern mine threats	Jan/Feb 94:18
Monterey students design future ships	Jan/Feb 94:32
<i>Ticonderoga</i> -class tribute	Jul/Aug 94:18
Value engineering (Aegis program)	Sep/Oct 94:2
Hail to the Chief: USS <i>Chief</i> commissioning	Nov/Dec 94:12
<i>Knox</i> -class decommissioning/tribute	Nov/Dec 94:18
Fleet update (chart)	Nov/Dec 94:21

Professional development

Know your harbor pilot	Mar/Apr 94:15
Shiphandling simulator	Mar/Apr 94:17
Message to young surface warriors	Mar/Apr 94:44
Recruiting tour for surface warriors	May/Jun 94:10
Recruiting: The Navy is hiring	May/Jun 94:11
Surface forces lead the way (VADM Reason)	May/Jun 94:44
Officer screening (VADM Quast)	Jul/Aug 94:40
1994 SNA Symposium	Nov/Dec 94:25
Surface warfare writing contest	Nov/Dec 94:31
The surface warrior's Naval Institute	Nov/Dec 94:32
CNO's tribute to the surface warrior	Nov/Dec 94:44

Professional achievement

New surface flag selects	Mar/Apr 94:20
Top Naval Academy grads choose SW	May/Jun 94:9
Battle "E" winners	May/Jun 94:34
SWOS staff cited for leadership training	May/Jun 94:36
OSCS(SW) Sole cited as outstanding instructor	May/Jun 94:37
<i>Comstock</i> wins Marjorie Sterrett Award	Jul/Aug 94:42
Warfighting grocer: SM1(SW) Tuck	Jul/Aug 94:8
Surface Sailors of the Year	Sep/Oct 94:10
Navy League award winners	Sep/Oct 94:11

Safety and damage control

Integrated machinery/battle-damage control systems	Jan/Feb 94:26
<i>Germantown</i> adrift in Hong Kong Harbor	Jan/Feb 94:30
Surface Navy's record year in safety	Jul/Aug 94:43
Built Burke tough: <i>John Paul Jones</i> shock trials	Nov/Dec 94:28

